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THE LAYING OF THE MEMORIAL STONE OF THE NEW WING BY H.R.H. THE PRINCE OF WALES, K.G.

ON the 6th of June, 1893, the memorial stone of the new wing of the Royal United Service Institution was laid by H.R.H. the Prince of Wales, K.G.

The ceremony was performed in a marquee covering the site of the new lecture theatre, library, and offices of the Institution, adjoining the building hitherto known as the Banqueting House, Whitehall, which will hereafter be the museum of the Institution.

Guards of honour, furnished by the Royal Navy and the Coldstream Guards, were drawn up at the north entrance, and the ground in Horse Guards' Avenue was lined by detachments of the 2nd Life Guards, the Pensioners of the Royal Hospital, Chelsea, and by the boys of the Royal Hospital School, Greenwich, and Duke of York's Royal Military School.

Their Royal Highnesses the Prince and Princess of Wales were received by H.R.H. the President of the Institution (Field Marshal the Duke of Cambridge), the Chairman (General G. Erskine), Vice-Chairman (Admiral H. Boys), and Members of the Council, and by the Chairman of the Bazaar Committee (H.S.H. Prince Edward of Saxe-Weimar) and the Members of the Committee,

and were conducted to the dais erected in the marquee, where many of the members of the Royal family were assembled.

The National Anthem having been sung, and prayers having been offered by His Grace the Archbishop of Canterbury, the Chaplain of the Fleet, and the Chaplain-General, H.R.H. the President of the Institution presented an address, after which H.R.H. the Prince of Wales laid the memorial stone and declared it to be well and truly laid.

H.R.H. the Princess of Wales then received purses containing sums of money presented to the building fund, after which, at the request of H.S.H. the Chairman of the Bazaar Committee, His Royal Highness the Prince of Wales opened the bazaar in aid of the building fund, which was held in the future museum of the Institution.

[*Authors alone are responsible for the contents of their respective Papers.*]

MILITARY ESSAY No. 11.*

(HONOURABLY MENTIONED.)

THE MILITARY ORGANIZATION BEST ADAPTED TO IMPERIAL NEEDS.

By Colonel J. DUNCAN, A.Q.M.G., Head-Quarters.

"Neither armies nor generals can be improvised by a decree."

I. OUR PRESENT MILITARY ORGANIZATION.

No one who examines closely our present military organization can fail to be struck by the fact that, notwithstanding all the steps taken during the past 20 years to improve the condition of our land forces, we are still far from being in a state of preparedness for war.

And yet, during the period referred to, numerous reforms have been introduced into our military system, many of them of a most radical nature. Some of these reforms have been carried out in face of the strongest possible opposition, not only from the general public, but also from military men of great experience. Time, however, has proved most, if not all, of them to have been in the right direction.

Thanks to the system inaugurated in 1872, we have now a tangible Reserve numbering about 75,000 men; the Line, the Militia, and the Volunteers, which used formerly to be divergent forces, have now been intimately associated together; the military education of our officers has been raised from zero to a standard that the most sanguine army reformers could never have anticipated; and every branch of military training has been correspondingly improved. In short, our army is to-day, in every respect, infinitely superior to what it has ever been at any previous period of our history.

We do not, however, appear to have as yet fully realized that the conditions of war have entirely changed. Formerly, when troops and convoys could move but slowly, the difficulty of subsisting armies engaged in operations necessarily limited their strength. It is now otherwise. Improvements in the means of communication have given to military operations astonishing rapidity, and the facility with which large masses of troops, provisions, and stores can now be

* *Note by Editor.*—The other essays which were honourably mentioned (Nos. 4 and 7) will be found in the May and June numbers of the Journal respectively, the publication of these essays being in the order in which they were received for adjudication.

transported to great distances has had the effect of proportionately increasing numbers. As a result of these new conditions we see to-day, on the Continent of Europe, not armies, but nations in arms.

France, with a population of about 38,000,000, has the peace footing of her army at a strength of about 520,000 men; and when the recruiting law of July, 1889, is in full operation, the number of trained men at her disposal will exceed 4,000,000.

Germany, with a population of about 50,000,000, has the peace footing of her army at a strength of about 487,000, and when the latest recruiting law has had time to operate fully, her fighting strength will be represented by upwards of 2,500,000 trained men. In the meantime, the necessity of providing a counterpoise to the increasing forces of France and Russia has recently resulted in the German Government bringing forward bills, which are now under the consideration of the Federal Council, for further increasing the armed strength of the Empire to an extent that will at least outstrip France.

All the other Powers on the Continent stand armed to the teeth in somewhat similar proportions.

But when we turn to our own army, we find that not only are our numbers wholly inadequate to meet the requirements of modern war, but that there are other elements in our organization which combine to diminish further our military strength.

Our land forces, excluding Colonial corps, may be set down in round numbers as follows:—

Regulars (including depôts)	about	200,000 men.
Reserves	„	75,000 „
Militia (Great Britain and Ireland) ..	„	100,000 „
Volunteers	„	220,000 „
Yeomanry Cavalry	„	10,000 „
Total		605,000 „

If from this we deduct upwards of 100,000 men permanently stationed abroad in India and the Colonies, we have left for home defence a heterogeneous force of about 500,000 men without means of any further expansion. Of this number only about 170,000 (including the last joined recruits) could be drawn upon for offensive purposes.

Let us now examine separately the different forces that go to make up our armed strength.

Regulars.

The units of the different arms of the Regular army are distributed between Home, the Colonies, and India as follows:—

	At Home.	In Colonies and Egypt.	In India.	Total.
Cavalry regiments	20¾	1¼	9	31
Artillery—				
Horse batteries.....	9	..	11	20
Field „	38	..	42	80
Mountain „	1	1	8	10
Garrison companies....	22	19	27	68
Engineers—				
Troops, divisions, companies, and sections	32	15	1	48
Infantry battalions	72	23	53	148

Our Regular troops are not organized in permanent army corps, divisions, or brigades, but are distributed to garrisons according to requirements. Many of these garrisons are small, and there are many cases, with each arm, of units being completely isolated, with few, if any, opportunities of being exercised with troops of the other arms while so situated. Much has, however, been done during the last few years towards the greater concentration of our troops, and the reduction of the numerous small detachments; but as the question of concentration depends upon the provision of barrack accommodation, the process, which is very costly, must of necessity be gradual.

In connection with this subject, the following extract from the report[1] of the Committee on the reorganization of the French Army in 1872 may be instructive, as it seems to draw, in some respects, a picture of our own case:—

"Before the war of 1870, France was divided into great military commands.

"These commands, excepting Paris and Lyons, which admitted of active organized forces, were, in fact, only territorial commands, comprising a certain number of territorial military divisions and subdivisions.

"Usually the Generals commanding had under their orders only depôts or fractions of corps, which they occasionally united in order to review them; the most fortunate were able to group in this manner one or two regiments.

"The constituted brigade and division only appeared as exceptions at Paris and Lyons. In other places nothing was formed but the regiment, and its strength, weakened by the great number of furloughs given each year for economical reasons, was, for the most part, scattered in a multitude of little garrisons, to the great detriment of instruction and discipline.

"We need hardly add that none of these groups were completely provided with the material which would be necessary to enter on a campaign.

"The result was dispersion and breaking up of corps; Generals

[1] Part II, "General Organization," translated by Major C. B. Brackenbury, R.A., D.A.A.G.

forgetting their position and teaching nobody; inferior officers without real command, and, consequently, without responsibility or means of instruction.

"In one word—no preparation for war.

"This was our condition when the events of 1870 burst upon us.

"We found ourselves without preparation, without organization, and, it may be added, without direction; armed with an inferior artillery, face to face with an enemy long ago prepared, strongly organized, and having in his favour the advantage of numbers and superiority in commanders.

"We could not but succumb, and these, gentlemen, were the causes of our reverses.

"We were beaten by the want of preparation, organization, and direction, and by the weakness of our effective, rather than by the arms of our enemies."

Army corps have, it is true, been organized from time to time on paper, the Militia and Volunteers being combined with the Regulars when these army corps have been intended for home defence. At one time we see no less than eight such army corps appearing regularly in the Monthly Army List. Then this organization is suddenly abandoned, and the next scheme is to have two army corps and a cavalry division with lines of communication troops ready for active service abroad. Lately, however, all our available land forces have been organized in three army corps and a division of cavalry, with troops told off to garrison the different fortresses, for purposes of home defence.

Such schemes, however perfect they may be in theory, can each only last a certain time, for it is impossible to ensure interest being kept up for any prolonged period in an organization that may never become a reality.

But perhaps the worst feature of organizations that exist only on paper is that they can too easily be either abandoned or completely changed by a stroke of the pen, in which case all the expense that may have been incurred in connection with them is lost.

Apart, however, from the question of organization, there is the difficulty that has long been experienced, of obtaining the number of men required to complete our establishments. Moreover, we are obliged to accept, as the majority of our recruits, lads who are not of sufficient age or physique to undergo the strain of even peace service either abroad or at home, though, if given time, they eventually develop into efficient soldiers.

The consequence is that battalions at home have necessarily to be depleted to provide drafts for their linked battalions abroad, and even then there is a failure to supply the number of men required for this purpose. The process, in the meantime, leaves the home battalions composed chiefly of immature lads of inferior physique due to their youth.

In these circumstances it is not surprising to read in the Report of Lord Wantage's Committee that the "system now in operation, though by no means fully adequate as hitherto carried

out, has been so far successful that the efficiency and excellence of our army in India is testified to by undisputed evidence," while the evidence of officers of the highest authority is quoted to the effect that there is not a single infantry battalion at home efficient. The report continues as follows: "It is true that, as pointed out by the officers whose evidence is quoted above, it was not contemplated under the organization adopted in 1872, that battalions at home should be efficient for active service without being completed from the Army Reserve; but the Committee are in complete accord with them in believing that it was never intended that the infantry at home should be reduced to the condition described above."

If we can imagine such battalions raised to a war footing by the addition of Reserves, of whom many have been in civil life for prolonged periods, and who have received no training to speak of since they left the colours, then we have a tolerably accurate picture of the state of our Regular army at home as regards its efficiency for war.

Militia.

The Militia, though not a very highly-trained force, has always been found most useful for taking the place of the Regulars whenever the latter have been required for active service abroad. When embodied, a period of a few months suffices to make them into fairly efficient soldiers.

But the force is considerably below its authorized establishment. It has no Reserve, nor are there any means of creating one. Moreover, comparatively few of the officers have served in the Regular army, which is a decidedly weak point in the constitution of the force.

Volunteers (including Yeomanry).

It is impossible to think of the Volunteers without admiring the loyalty and patriotism that have induced them to come forward and offer themselves gratuitously to be enrolled, organized, and trained for the defence of their country. Nor can there be any doubt that the amount of good the Volunteers have done in creating and fostering a military spirit in the country is simply incalculable.

But does it not seem incredible that a nation, with such interests at stake as we have, should be relying on a force whose training is wholly insufficient for the serious purposes of war, whose officers, as a body, have no military experience whatever, whose discipline must necessarily be weak, and who can disband themselves at 14 days' notice?

There is, however, another element in the constitution of the Volunteer force, which is perhaps the most serious one of all. Have we ever considered what the effect would be of calling out the Volunteers in the event of an invasion of England being threatened? I assume, of course, that they would be withdrawn from their professions and trades, and distributed to garrisons as required. Would they not with one voice exclaim, "Why should the blood tax fall only

on us? We certainly during peace prepared ourselves for war, but we only did what everyone else should have done."

The Volunteers have indeed set an example which they had a right to expect every able-bodied man in the United Kingdom would follow. They have shown us how the manhood of the nation could be organized and trained for an emergency, without all being required to pass through the ranks of the Regular army, and we should have seized and acted upon the idea, instead of leaving those who had shown us what could be done to bear the whole burden. The tax, though self-imposed, is an unequal one, and would not stand the strain of war.

But it will, I know, be said that, in the event of an invasion of England becoming imminent, every man would at once become a Volunteer. The reply is that it would then be too late. Numbers, without organization, discipline, or training, would be worse than useless. The French[1] learnt by bitter experience that "neither armies nor Generals can be improvised by a decree, and that if education is rapid on the field of battle, its cost is far too dear"; also that "time is no longer, as formerly, on the side of the defence"; and that "permanent preparation, then, and rapidity of mobilization, stand forth as the two indispensable conditions of every army organization."

The Volunteers, as at present constituted, can hardly therefore be regarded as a wholly reliable force.

II. Proposed Military Organization.

The insufficiency of our present military organization being admitted, it will be necessary, in dealing with the question of an alternative, to bear in mind the following facts:—

1. That our insular position confers on us advantages possessed by none of the Continental Powers.

2. That our navy must ever be our first line of defence, and should accordingly be in a position to resist any combination likely to be brought against it.

3. That no form of purely voluntary enlistment or enrolment will ever produce the numbers required under the new conditions of war.

Keeping these facts in view, and assuming that our policy is to be, as far as possible, one of non-intervention in the affairs of the Continent, I propose that our land forces should consist of (1) an active army (Regulars), raised, as at present, by voluntary enlistment, and available, as at present, for general service at home and abroad; and (2) a territorial army raised by conscription, and primarily intended for home defence, but available, if required, to supplement the active army in the event of our being involved in a great European or American war.

Terms and Conditions of Service in the Active Army.

In considering the terms and conditions of service in the active army, the main principle to be borne in mind is that, no matter what

[1] See Report of Committee already quoted.

reasonable inducements may be offered, there is a limit to the number of men who will enlist. It should be our aim to secure the pick of that number without unnecessary expenditure.

Now, Sir Arthur Haliburton, in his remarks appended to the Report of Lord Wantage's Committee, has clearly shown that a failure to obtain the required numbers for drafts has been, in some measure, due rather to defective administration than to a general failure of the supply. There should be no difficulty in remedying this cause of failure.

He has also cleared up a very wide-spread misapprehension on the subject of regimental establishments. If, as pointed out by him, the home battalion is supposed to reach its maximum establishment only just before despatching a draft to the foreign battalion, and to shrink to its minimum on the day the draft starts; and if, under normal circumstances, the annual draft varies from 162 to 175 men, then the home establishment is, in fact, only 600 instead of 777, as has generally been supposed, all in excess of the former number belonging to the next draft.

If this be really the intention it should be clearly laid down, and no battalion at home should be allowed to fall below 600. If this were carried out, it would not only prevent the home battalions from becoming inefficient, but would deprive Commanding Officers of all cause for complaint on account of these drafts, for they would then feel that the training of drafts for the foreign battalion was actually giving them the advantage of an accession to their peace strength. This would be the limit of efficiency, as regards numbers, that could be expected. It would be quite unreasonable to expect home battalions to be efficient for active service without their Reserves.

There is, no doubt, much truth in the conclusion drawn by Sir Arthur Haliburton, from the evidence before the Committee, "that, as a rule, the motives which induce young men to enlist have little connection with pay and allowances, and that even if these were improved, we should still continue to obtain exactly the same class of recruit that now enlists." But we want to obtain not only that class, but also a good sprinkling of a better class, of whom we can make non-commissioned officers. Moreover, there is not only the obtaining of the recruits, but the retaining of them when obtained, to be considered; in other words, prevention of desertion.

There can be very little doubt that the inducements at present offered are not such as to attract a really good class of men to the army. But the terms of service are more at fault than the pay and position of the soldier. It is hardly reasonable to expect a well-to-do man to become a soldier for seven or eight years, with the prospect of being, at the end of that time, turned adrift. The terms of service should be so elastic that a man may be free, within reasonable limits, to choose whether he will make the army his profession or serve in it for only a limited period.

With this view, and having regard to the requirements of India and the Colonies, the terms of service should be as follows:—

a. Enlistment to be for eight years in the army, and four years in

the Reserve (the conversion of seven years to eight years when abroad would always be looked on as a grievance), with option, if approved, of extending to 12 years, and re-engaging to complete 21 years.

b. Men on home service to be allowed to pass freely to the Reserve after three years' service with the colours.

c. Men in the Reserve, having already had the option of remaining with the colours, to have no actual claim to be allowed to return thereto, but, within reasonable limits, to be allowed to return at any time before they are within three years of the expiration of their engagement.

d. Similarly, men, who have re-engaged to complete 21 years, to be allowed to pass freely to the Reserve, to complete the period of their re-engagement.

e. Enlistments for Section D of the Reserve to be for three years, and men to be allowed to re-engage for periods of three years, provided the total continuous period in the Reserve does not exceed nine years.

The pay, position, and prospective advantages of the soldier should be improved or altered as follows:—

a. Whether or not his pay be increased, or adjusted so as to get rid of the stoppage for messing, the "general charge" for barrack damages (which is the most inequitable of all the stoppages) should be abolished.

b. Stoppages for "sea kit" and Indian clothing should certainly also be abolished.

c. His clothing should eventually become his own property.

d. Good conduct badges should be obtainable after two, four, eight, twelve and sixteen years' service.

e. Deferred pay, which, as a rule, only serves the purpose of inducing men to pass to the Reserve thoughtlessly, should be abolished, and a gratuity of 1*l*. for each year's service up to 12 years substituted, as recommended by Lord Wantage's Committee.

f. The pay of Section D of the Reserve should be raised to the same as that of Sections B and C, as recommended by the Committee.

g. All men who serve 21 years with the colours and Reserve should be given a pension on discharge, the rate of pension being regulated by the length of service with the colours.

Men in the Reserve should undergo at least 21 days' training every second year.

The Reserves should be made available for small wars, as well as for great wars. It is absurd that we should pay for a Reserve without being able to use it at the very time it is most likely to be wanted. In the event of only a limited number of the Reserves being required, they might be obtained by calling for volunteers, those belonging to the corps to be employed having the preference.

Failing the required number being obtained in this way, the difference could be made up from the Reserves of the corps concerned.

Terms and Conditions of Service in the Territorial Army.

The territorial army (which would be based on the principle of universal liability to personal military service from 18 to 45 years of age) to consist of—

First line, with its reserve.
Second line, with its reserve.
Third line (Landsturm, or *levée en masse*).

Service ordinarily to commence, say, on April 1 of the financial year following that in which the conscript attains 20 years of age, and to be for the following periods:—

3	years	in the first line.
4	,,	reserve of first line.
5	,,	second line.
6	,,	reserve of second line.
Total....	18	years.

The third line (Landsturm, or *levée en masse*) to consist of all men liable to service, and belonging neither to the army nor navy, from 18 to 45 years of age, and to be divided into two classes. All Landsturm men, till March 31 of the financial year in which they attain 38 years of age, to belong to the 1st class; all others to the 2nd class.

Only men declared unfit for all military service to be entirely exempted from conscription.

Provisional exemptions, however, to be granted, under certain fixed rules, for family, educational, or other reasons, and to men of certain professions.

All men not exempted entirely or provisionally to draw lots, and to be taken for the territorial army, in the order of the numbers drawn, up to the number fixed for the annual contingent.

With a population, according to last census, of nearly 38 millions, it is estimated that, after granting exemptions on a liberal scale, and allowing for the wants of the navy and the active army, an annual contingent of about 100,000 men could easily be obtained, and would suffice to meet requirements.

A certain number of one year volunteers (say, 10,000 each year) to be allowed on somewhat the same principles as in Germany and France.

Approved men, of 18 years of age and upwards, to be allowed, under certain fixed rules, to engage voluntarily for five years in the first line, and, up to 45 years of age, to re-engage for periods of five years, so long as they remain efficient. The total number so engaged and re-engaged, however, not to exceed one-fifth of the strength fixed for the standing portion of the first line. These men and the officers

would form the permanent portion of the territorial army, and would serve to give it some backbone.

This permanent portion would consist practically of men who at present join the Militia. Some inducements in the way of bounty, as now given to the Militia, would be necessary to secure really good men for this portion of the territorial army, from which the non-commissioned officers would chiefly be drawn.

It is estimated that a strength of about 270,000 men would probably suffice for the standing portion of the first line on a peace footing. Assuming this to be the number decided upon, it could be made up somewhat as follows:—

Permanent portion	54,000
In 1st year, including 10,000 one year volunteers	100,000
In 2nd year, deducting losses.....	86,400
In 3rd year, deducting losses, and reducing by dispensing with service of highest numbers in excess	29,600
Total	270,000

Of this number 260,000 would be paid for by the public, the one year volunteers being fed, clothed, equipped, mounted, and maintained at their own expense.

It might be preferable to dispense altogether with the third year's service (except for men of mounted branches, and men of other branches, who might, from one cause or another, be still inefficient after their second year's service), in which case the permanent portion could be increased accordingly. Men whose third year's service happened thus to be dispensed with would of course be available to rejoin, if required to do so.

It will be seen by the table, given as an Appendix, that in 18 years the proposed scheme would produce upwards of 1,500,000 men. The losses by desertion, death, &c., have been reckoned at 4 per cent. for the first year, 3 per cent. for the second, and 2 per cent. for all the other years.

Men of the first line to be called up and trained on exactly the same principle as that on which the Militia are now trained, except that the recruits' course should last for at least 84 days, and the annual training for at least 42 days immediately after the recruits' course has been completed. There might be optional drills, on the principle of the Volunteer drills, at other times during the year.

Men in the reserve of the first line to be called up in their fifth and seventh years' service, that is, twice during their reserve service (two contingents at a time), for 21 days' training with the first line, and to be eligible to attend the optional drills of the first line, if they wish to do so.

Men of the second line to be trained on somewhat the same principle as that on which the Volunteers are now trained, each man being required to undergo a certain number of drills (say 10) each year, or double that number in two years.

Men in the reserve of the second line not to be required to undergo any training while in that reserve, but to have the option of attending the drills of the second line, whenever they may feel inclined to do so.

Men belonging to the third line (Landsturm, or *levée en masse*) to be liable to neither trainings nor musters in peace.

Men of the first line and its reserve, when called up for training, to receive the same pay and allowances as the Militia would receive, but of course no bounty, unless they belong to the permanent (or voluntarily engaged) portion of the territorial army.

Men of the second line might also receive a day's pay and allowances for each obligatory drill they attend.

The provision of horses for the training of the mounted branches of the territorial army could be arranged for in a variety of different ways, but perhaps the best plan would be to enter into agreements for the hire of the required number of suitable horses for the period referred to. For war purposes, however, conscription would have to be applied to horses as well as to men, and, with this view, it would be necessary that all horses should be registered.

The standing portion of the first line, or any portion of it that might be considered necessary, would be available to be embodied, to take the place of the active army, in the event of the latter being required for active service abroad.

In the event of a general mobilization of the territorial army being ordered, the whole of the first line would be embodied, and brought up to war strength, from the youngest contingents of the Reserve; the last joined recruits, if not completely trained, would be handed over to the depôts, where their training would be completed, their places in the first line being taken by the Reserve men. The recruits, when trained, and the remainder of the Reserve would be held in readiness to replace casualties, and reinforce generally the first line.

On the first line being ordered to take the field, the second line would be embodied, to furnish garrisons where required and for local defence generally. Its Reserve would only be called out, by annual contingents, commencing with the youngest, as required.

The third line (Landsturm, or *levée en masse*) would be the last reserve of the nation, and would only be called upon in the event of the gravest national emergency.

Men of the territorial army should, at all times, be eligible for enlistment in the active army (Regulars), or in the permanent portion of the territorial army (present Militia), subject to the recruiting regulations of those services; for the fundamental idea of the territorial army is that it undertakes the organization and training of men who do not belong to the Regular army or to the present Militia, but it is not intended to prevent them from joining those services.

Nor is there anything in the proposed scheme inconsistent with the continuance (but of course under another name) of the Militia Reserve, if thought desirable; but as there would probably be no difficulty in obtaining volunteers from the territorial army, if

required, in the event of war, the expenditure involved in keeping up such a Reserve could, it is thought, be more profitably expended in some other direction.

Officers for the Territorial Army.

Whatever difficulties there might be as to some of the details of the proposed scheme, there should be none as regards officers for the territorial army.

It is a strange fact that the non-effective list contains the names of many officers who are in the prime of life and perfectly effective, but who, owing to certain hard and fast rules, have, much against their own wills, been placed upon retired pay, and condemned to spend the remainder of their days in enforced idleness, though both able and willing still to serve. The retired pay of such officers must amount to a considerable sum annually.

By a similar anomaly, there is quite an army of unemployed lieutenant-colonels and colonels on the active half-pay list, who are deploring their enforced inactivity and pining for employment. Though the half pay is a mere pittance to each individual officer, the total constitutes a considerable item in the Army Estimates.

Surely the country has a right to expect some return for this expenditure, and surely we have here the elements for filling the higher commissioned ranks of the territorial army with officers of experience. Service up to a certain age in the territorial army should be a condition invariably attaching to retired pay and pension, unless the officer be pronounced medically unfit to serve.

The commanding and field officers, and one half at least of the captains of the territorial army should be officers who had served in the Regular forces.

Constitution of an Army Corps.

The terms and conditions of service being settled, the next point for consideration is the constitution of an army corps, as that will be the basis of the territorial division of the country, on which the whole of the proposed military organization will depend.

The actual constitution of an army corps will always depend very much upon the operations on which it is to be employed, and on a variety of other circumstances that will differ greatly in different cases. It is, however, desirable, for many reasons, to decide what shall be the normal constitution of an army corps.

An army corps is essentially a small army, and should be provided with all the means of independent action. With this view, it should be composed of a proper proportion of the different arms, while its strength should be limited to what one General can effectively command.

There are many obvious advantages in having an army corps constituted in three divisions. Such a formation admits of two divisions being employed in the first line, while one is held in reserve. But an army corps which has only 24 divisional battalions can only be

formed in three divisions by unduly weakening the divisions and brigades, which thereby become comparatively insignificant commands, and much inferior in numbers to the corresponding units in Continental armies, to which they might find themselves opposed. When, therefore, an army corps is formed in three divisions, it should have 36 divisional battalions of infantry. This would, however, render it somewhat unwieldy in size.

On the other hand, an army corps formed in two divisions would seem to answer all practical purposes. If acting independently, it could be employed with one division in front line, and one in support; or each division might have a brigade in front line, and a brigade in support, or both divisions might be deployed in front line, each with half a brigade in rear of its outer flank.

There appears to be much sound reasoning in the following remarks of the Committee on the reorganization of the French army (already referred to) with regard to this subject:—

"Let us suppose two armies face to face, each 200,000 strong; the first composed of four corps of three divisions, as the Government would have it; the second of six corps of two divisions, the number of divisions being the same in both cases."

"Most frequently the line of battle of the first army will be formed of two divisions from each corps, the third division being placed in reserve behind the centre of the two others."

"The second army, with four of its corps deployed in the same manner but without a reserve division, will occupy the same front as the first."

"But the commander of the second army will have two corps at his disposal which he can send in a mass against one of the adversary's wings, the latter being only able to oppose to this turning movement the reserve division of the threatened army corps."

"In case then of an equal total strength there is the advantage in having a greater number of army corps, though each corps will be weaker. We will, therefore, organize our fighting army in 18 corps of two divisions, instead of adopting the 12 corps of three divisions, as proposed by the Government. In either case there would be 36 divisions."

On the whole, therefore, it seems preferable that the army corps should be constituted in two divisions.

Assuming this to be admitted, the following would appear to be the proportion of the different arms of which an army corps should be composed:—

24 battalions of infantry of the line, in two divisions, each of two brigades, each of two demi-brigades, each of three battalions (under a colonel).
1 battalion of rifles.
3 regiments of cavalry, forming a brigade (a cavalry regiment being attached to each infantry division when necessary).
12 batteries of field artillery (three being attached to each division, and six belonging to the corps artillery).

3 batteries of horse artillery (one being attached to the cavalry brigade, and two belonging to the corps artillery).
3 field companies of engineers (one for each division, and one for the corps).

Each battalion of infantry should be divided into four instead of eight companies, as the latter arrangement does not give companies of sufficient size for either tactical or administrative purposes; this is particularly felt on a peace footing.

Each regiment of cavalry should be divided, as at present, into four squadrons.

The artillery (both horse and field) should be permanently organized in groups of three batteries. Any smaller number would be an insufficient command for a lieutenant-colonel. A group of three batteries might be termed a brigade.

Territorial Division of the Country.

The next problem that presents itself for solution is the territorial division of the country for purposes of army administration, mobilization, and command.

So far as regards the infantry of the Regular army, it is stated in the Report of Lord Wantage's Committee that "the evidence as to the value of the territorial connection is overwhelming," and that "the advantage of the system of regimental training for men destined for India over the alternative and far more expensive system of depôts can hardly be over-estimated." Any one who has studied the subject must be convinced of the soundness of these conclusions. It is proposed, therefore, to adhere to the principle of the existing system, to extend it to the Regular artillery, also in a modified form to the Regular cavalry, and to make this territorial connection of the Regular army the basis of the organization of the territorial army.

The population of the United Kingdom on April 6, 1891, was as follows:—

England and Wales.....	29,001,018
Scotland	4,033,103
Ireland	4,706,162
Total....	37,740,283

These figures, taken with the existing number of line regiments to be provided with regimental districts, seem to lend themselves most conveniently to a division of the country into eight army corps districts, each with a population of from 4,000,000 to 5,000,000 of inhabitants, Scotland and Ireland each exactly constituting a district. In dividing England and Wales into six districts, regard should be had to county boundaries.

Each army corps district to be subdivided according to population, and with due regard to county boundaries, into eight regimental districts, and, for the purposes of the territorial infantry, each regimental district to be further subdivided, according to population, into four battalion districts.

Organization of the Active Army.

Assuming the Cameron Highlanders to be converted into a battalion of the Guards, as recommended by Lord Wantage's Committee, there remain 66 regiments of Regular infantry of the line, each of two battalions, besides the King's Royal Rifle Corps and the Rifle Brigade, each of four battalions.

The Scottish Rifles and one of the numerous Yorkshire regiments might be formed into a rifle corps of four battalions, to be styled "the Queen's Royal Rifle Corps," the remaining 64 regiments to be distributed equally, eight being allotted to each army corps district, that is, one to each regimental district. The rifle corps to be recruited over the United Kingdom generally.

This arrangement would relieve Scotland, which is at present overregimented, of three battalions (viz., Cameron Highlanders, one, and Scottish Rifles, two), leaving there four kilted and four trewsed regiments, while it would leave undisturbed the eight regiments at present recruited in Ireland. It would be desirable, however, that the Royal Irish Rifles should revert to a red-coated regiment of the line.

The Royal Regiment of Artillery to be broken up, the horse, field, mountain, and garrison artillery being entirely separated from each other.

The 20 horse batteries to be formed into one regiment, with headquarters and depôt at Woolwich.

The 80 field batteries to be formed into eight regiments, each of 10 batteries, one being allotted for recruiting purposes to each army corps district.

The 10 mountain batteries to be formed into one regiment, with depôt at Woolwich.

The 68 companies of garrison artillery to be formed into four battalions, each of eight companies, and four battalions, each of nine companies, one battalion being allotted for recruiting purposes to each army corps district.

The horse and field artillery, as already suggested, to be permanently organized in brigades of three batteries each, so far as the number of batteries in each regiment will admit.

The brigades, batteries, and companies at home to supply drafts to those abroad.

The 28 regiments of cavalry of the line to be allotted for recruiting purposes to the eight army corps districts, four districts receiving four regiments each, the remaining four districts receiving three regiments each. The regiments to be allotted to Ireland would naturally be the 4th Royal Irish Dragoon Guards, 5th Royal Irish Lancers, 6th Inniskilling Dragoons, and 8th King's Royal Irish Hussars. The 2nd Dragoons (Royal Scots Greys) would naturally fall to Scotland, which should also be allotted a Lancer regiment and a Hussar regiment.

Each cavalry regiment to have a permanent depôt for raising and receiving recruits. The cavalry depôts of each army corps district

to be permanently grouped together as a cavalry brigade depôt. The cavalry recruits might receive at these depôts instruction in the elements of foot drill and riding before being passed on to their regiments.

Each cavalry regiment, before proceeding abroad, to form a depôt squadron. The depôt squadrons of cavalry regiments abroad to be formed into provisional cavalry regiments, each of three or four squadrons, to train men for their respective regiments, whose wants in this respect should be anticipated, and the strength of these squadrons kept up accordingly. These depôt squadrons to be quite distinct from the fixed territorial depôts, from which they would receive recruits, after such recruits had received the prescribed amount of elementary instruction.

Organization of the Territorial Army.

The proposed scheme contemplates the territorial army being absolutely localized. Thus, each army corps district would contain an army corps of the first line and the army corps of the second line that had developed out of the first line army corps referred to. Similarly, the four first line territorial battalions and the four second line territorial battalions of each regiment would be located in the four battalion districts into which each regimental district would be subdivided. Each battalion would draw its recruits from the battalion district in which it was located, and its reserves would be domiciled in that district. It will be evident that under these circumstances the mobilization of the territorial army would be an extremely simple process.

On mobilization, the fourth territorial battalion of each regiment would distribute its trained men among the other three battalions, and would itself become the depôt for recruits and reserve men held in readiness to replace casualties in the three other battalions.

The cavalry, artillery, engineers, rifle battalions, and other corps of the territorial army would be recruited over the whole army corps district.

Designations and Numbers.

A glance at a military map of the United Kingdom as at present divided into districts suggests the idea that the eight proposed territorial army corps districts might be designated respectively the "South-Eastern," "South-Western," "Eastern," "Western," "North-Eastern," "North-Western," "Scottish," and "Irish" districts.

The eight territorial army corps of the first line might be assigned the odd numbers from 1 to 15 inclusive, and those of the second line the even numbers from 2 to 16 inclusive. Thus the South-Eastern District would be the district for the 1st and 2nd Army Corps; the South-Western District would be the district for the 3rd and 4th Army Corps; the Eastern the district for the 5th and 6th Army Corps; and so on. This system of numbering would admit of fresh

army corps being added to either line without interfering with the numbering of the army corps in the other line.

Though not belonging to the school who hold that the army has gone to the dogs owing to the removal of the regimental numbers, I think the time has arrived when for administrative purposes the infantry regiments might be re-numbered. The eight regiments proposed to be assigned to the South-Eastern District might be numbered from 1 to 8 inclusive, the eight to the South-Western District 9 to 16 inclusive, the eight to the Eastern District 17 to 24 inclusive, and so on, going from south to north, and then across to Ireland, the regimental districts bearing the same numbers as the regiments connected with them. For sentimental purposes a page in the "Army List" might be devoted to show the order of precedence of the different regiments of infantry of the line, and thenceforth the old numbers might be consigned for safe custody to the tender care of the historical records of the regiments concerned.

Line battalions of the active army to be numbered 1st and 2nd as at present; those of the first line territorial army to bear the odd numbers from 1 to 7, and those of the second line the even numbers from 2 to 8 inclusive. Thus, the four battalion districts in each regimental district would be the battalion districts of the 1st and 2nd, 3rd and 4th, 5th and 6th, and 7th and 8th territorial battalions respectively.

The field artillery regiments and garrison artillery battalions of the active army (Regulars) to bear the designation of the districts to which they belong. Thus, "the South-Eastern Regiment of Field Artillery," "the Western Battalion of Garrison Artillery," and so on.

The field artillery regiments and garrison artillery battalions of the territorial army to bear the numbers of the army corps to which they belong. Thus, "the 7th Territorial Regiment of Field Artillery," "the 7th Territorial Battalion of Garrison Artillery," and so on.

There does not appear to be any reason why the cavalry of the active army should not retain their present numbers and titles. The question of numbers and titles for the cavalry of the territorial army would require special consideration.

Distribution of the Standing Strength of First Line Territorial Army.

In each army corps district there would be 32 battalions of infantry of the line, and 1 battalion of rifles belonging to the first line of the territorial army, making altogether 33 battalions of infantry. This, multiplied by 8, gives 264 battalions for the 8 army corps. Assuming the peace establishment of a battalion to be 600 men, these 264 battalions would number altogether 158,400 men. This, deducted from 270,000, the proposed standing strength of the first line of the territorial army, would leave 111,600 men, which should, it is thought, suffice for all the other branches of the Service.

Organization of Commands.

Each territorial army corps district to constitute a distinct command.

The General Officer commanding an army corps district to have under his orders, not only all the troops quartered therein, but also the whole of the administrative services connected therewith, and to be responsible for all the recruiting, mobilization, supply, and other arrangements of the command. His Staff to consist of two portions, under the direction of a Chief of the Staff; one portion being charged with all that concerns the troops, the other with all that concerns recruiting, mobilization, reserves, and generally all services exclusively territorial; the former to march with the first line when it takes the field; the latter to remain in the district, and to secure the working of all the services therein. The General Officer commanding the district would himself take the field with the first line, and would be replaced by another General Officer in the command of the district.

General Officers commanding brigades and divisions to have no territorial power; there would therefore be no intermediate authority between the General Officer commanding the army corps district and officers commanding regimental districts. The authority of the latter would extend only to territorial services.

The commander of the forces in Ireland would command the Irish army corps district, the Belfast, Dublin, and Cork districts being styled sub-districts. The importance of the Irish command would thus make it an exception to the rule, in the preceding paragraph, that there should be no intermediate authority between the General Officer commanding an army corps district and officers commanding regimental districts.

Aldershot, Woolwich, Chatham, and the Curragh to constitute separate commands, the first three quite independent of any territorial district.

All establishments for the supply of the general needs of the army and the materials necessary for the general defence of the country to remain under the immediate authority of the War Office, General Officers commanding districts in which such establishments are situated exercising merely a general supervision over them in order to maintain discipline, but not interfering with their administration, for which they would be in no way responsible.

Distribution of Troops at Home.

The distribution of troops at home should be based upon the principle of keeping them in as large bodies as possible, in order that they may be trained and prepared for war, and in order that our senior officers may have practice in handling forces of some size. In any case, regiments of cavalry, brigades of artillery, and battalions of infantry should never be broken up if it can possibly be avoided.

We are all very familiar with the term "Army Corps," but who

among us has ever had the opportunity of serving in, or even seeing, a British army corps? And yet there does not seem to be any reason why we should not always have a complete army corps quartered at Aldershot.

It would also be easy to arrange that there should always be at least one complete army corps in Ireland. At present the cavalry in that command is a brigade in excess, while the artillery is one horse and six field batteries, and the engineers one field company, short of the establishment proposed in this scheme for an army corps.

If two complete army corps (one for Aldershot and the other for Ireland) be deducted from our home establishment, there remain 22 battalions of infantry, 15 regiments of cavalry, 14 field batteries of artillery, and 2 field companies of engineers at our disposal, or, as nearly as possible, the elements of a third army corps and two cavalry divisions to distribute over the country, as may be considered desirable.

There should be a tolerably large permanent camp either in Scotland or the north of England, to do for that part of the country what Aldershot and the Curragh do for the south of England and Ireland respectively.

There should be no paper army corps, but our War Office authorities, knowing exactly what troops are at their disposal, should study to combine them in a variety of ways, at the shortest possible notice, to meet different eventualities; and if our stores were decentralized, as they should be, every regimental district having all it needed, there should be no difficulty in rapidly mobilizing any portion of our forces and combining them for any required purpose.

Organization of the Staff.

"The Staff," says Lord Wolseley,[1] "is to an army what steam is to a locomotive. The machine itself may be of the highest order, the engineer who directs it may be a man of first class talent, but without the motive power of steam it is merely a huge collection of well-polished material."

And yet in our army there is no subject about which there is so great a confusion of ideas, as there is about the duties of the Staff.

This confusion, in its most exaggerated form, results in the administrative heads of the different departments in a command, each and all, having a pull at the strings of the General Staff work, no one knowing exactly where his own duty begins or where it ends, and consequently no one feeling his responsiblity to be clearly defined.

In an ideal command the General Staff, under the Chief Staff Officer, are the direct agents (eyes, ears, and mouth-piece) of the General, while the Technical and Departmental Staff take up their positions as the heads of the departments for which they are respectively responsible, and as the advisers of the General with regard to the subjects with which they respectively deal.

[1] "The Soldier's Pocket Book."

The War Office.

In dealing with such a subject as the military organization of a nation it would be impossible to avoid some allusion to the mainspring of the machine.

It is to be feared that the War Office can by no means claim to be entirely free from defects in organization, but its besetting sin appears to be excessive centralization. Suffice it to say that no military organization could meet the requirements of modern war without extensive decentralization from Head Quarters.

Cost of the Scheme.

It would require a very elaborate calculation to show exactly the cost of the proposed scheme, but a rough idea may be gathered from the fact that the cost of 134,629 Militia (including Permanent Staff and Militia Reserve) is estimated at 535,000*l.* a year. The 260,000 men of the standing portion of the first line territorial army to be paid for by the public would really represent so many Militia, but of whom only about 54,000 would receive bounties, and of whom none would belong to the Militia Reserve. To this would have to be added the expense of training two contingents of the Reserve for 21 days each year, and the expense of hiring horses for training the mounted branches.

The Volunteers cost about 781,500*l.* a year. The second line territorial army would probably cost about double that amount.

Concluding Remarks.

It would be impossible, within the limits of an essay, to give all the details of the military organization proposed in the foregoing pages. Many points have, therefore, been only just alluded to, while many others have been necessarily omitted altogether.

The compulsory portion of the scheme is a combination of the German, French, Italian, and Swiss systems, adapted to the circumstances of our insular position and our non-intervention policy. It has been styled "Conscription," but that is, perhaps, too hard a name for it. "Compulsory Organization and Training" might have been a more appropriate title.

The scheme aims at organizing the whole manhood of the nation for war, at a minimum of sacrifice both in money and personal service, while it keeps in view the principle that preparedness for war is the best security for peace.

APPENDIX.

Table of the Resources that would be furnished by the proposed Scheme for the First and Second Lines of the Territorial Army.

First Line.

1st year			100,000 men.
2nd „	deducting a loss of, say,	4,000	96,000 „
3rd „	„ „	2,888	93,120 „
	Total		289,120 „

Reserve of First Line.

4th year,	deducting a loss of, say,	1,862	91,258 „
5th „	„ „	1,825	89,433 „
6th „	„ „	1,788	87,645 „
7th „	„ „	1,752	85,893 „
	Total		354,229 „

Second Line.

8th year,	deducting a loss of, say,	1,718	84,175 „
9th „	„ „	1,684	82,491 „
10th „	„ „	1,650	80,841 „
11th „	„ „	1,616	79,225 „
12th „	„ „	1,584	77,641 „
	Total		404,373 „

Reserve of Second Line.

13th year,	deducting a loss of, say,	1,552	76,089 „
14th „	„ „	1,522	74,567 „
15th „	„ „	1,491	73,076 „
16th „	„ „	1,462	71,614 „
17th „	„ „	1,432	70,182 „
18th „	„ „	1,404	68,778 „
	Total		434,306 „

Recapitulation.

First line.....	289,120	643,349
Reserve of ditto..	354,229	
Second line	404,373	838,679
Reserve of ditto..	434,306	
Total.....	1,482,028	
Add permanent portion, say,	54,000	
Grand total	1,536,028 men, exclusive of officers.	

Friday, March 24, 1893.

LIEUT.-GENERAL E. F. CHAPMAN, C.B., R.A., Director of Military Intelligence, in the Chair.

THE BEST TYPE OF FIELD GUN FOR THE BRITISH SERVICE, INCLUDING THE QUESTION OF Q.F. GUNS.

By Captain J. HEADLAM, R.A.

PART I.

Introduction.
How many natures are required?
Uniformity of calibre.
Tactical considerations.
1. Weight behind splinter-bar.
2. Number of rounds per gun.

PART II.

Guiding principles in the choice of a type.
A. The gun.
B. The shell.
1. General requirements.
2. Consideration of shell in use.
C. The carriage.
1. Gun-carriages.
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3. Shields.

PART III.

Quick-firing guns.
1. Definition.
2. Ammunition supply.
3. Rapidity of fire.

IN a lecture on "Service Practice in 1888," Colonel Walford, addressing an audience of artillery officers, spoke as follows:—

"Outside the regiment there is the army, and the verdict of the army on the regiment is that by which we must stand or fall—must gain or lose prestige"; and, a few lines further on, "We shall be judged by the effect of our fire. The means by which we arrive at that effect are of interest to ourselves alone; so long as it is good, no one will ask or care how it became so."

With the first extract all gunners will agree; it is to the last few lines that I wish to direct your attention. No doubt they were true

when spoken more than four years ago; but in those four years many things have happened. The interest in field artillery practice, which the author I have quoted did so much to awaken, has spread outside the regiment. There are, I believe, now, a large number of officers of the other arms who take a great and growing interest not only in the effects of our fire but in the "means by which we arrive at that effect."

The general re-armament of the infantry has brought the question of that of the artillery prominently to the front. It is agitating military circles on the Continent, and is no doubt receiving the very serious attention of our own Ordnance Committee. At such a period I am, I think, not alone in my belief in the advantage of the fullest and freest discussion.

It has been my object in preparing this paper, not to advance original ideas, but to pass in review the main principles on which the re-armament should be effected, in order to facilitate such discussion.

How many Natures are required?

There have been advocates for the admission into our field artillery of—

Howitzers,
Heavy field guns,
Light field guns,
Heavy horse artillery guns,
Light horse artillery guns,
Quick-firing guns,

and even machine guns for the horse artillery.

With the latter, which are now generally regarded as concentrated infantry fire, I do not propose to deal at all.

In a similar way we may, I think, clear the ground at the other end of the list.

The revival of the howitzer practically dates from Plevna. The Russian artillery did not shine on that occasion, and the army was very justly dissatisfied with them; but, without doubt, modern field guns have little searching effect against earthworks. The Russians took the lead in introducing a howitzer for field service, which should have the power of searching out the defenders of such works by high-angle fire, and should further possess a shell heavy enough to break through and destroy overhead cover. The question has been a good deal discussed on the Continent, and General von Sauer has come forward as the great champion of vertical fire; but I do not think that even he has ever proposed that existing field batteries should be turned into howitzer batteries. What seems to be the more general idea, has been the formation of a comparatively small number of special batteries, outside the organization of army corps and divisions, which should be at the disposal of the Commander-in-Chief for special purposes; filling, in fact, exactly the same position as our heavy batteries do in India.

There we have four—one at the base of each of the main lines of advance on the N.W. frontier; one for very obvious local reasons at Secunderabad; and the fourth at the great railway centre of Jhansi. But these are not field artillery—a very valuable adjunct indeed—but one for which we are scarcely likely to reduce our force of field artillery, a force of which a French critic has lately written—"The number of batteries it could furnish for the field army is far below the normal requirements."

Putting aside, then, the question of machine guns and of howitzers, and leaving for the present that of Q.F. guns, many combinations of the others have been proposed, such as:—

i. One gun for heavy field batteries.
   ,, light ,,
   ,, horse artillery.

ii. ,, heavy field batteries.
   ,, light ,, and horse artillery.

iii. ,, all field batteries and the horse artillery of the corps artillery.
   ,, the horse artillery of the cavalry divisions.

iv. ,, all field batteries.
   ,, horse artillery.

v. ,, all field batteries and horse artillery.

i. This arrangement is practically non-existent, for though some nations, the Russians and Spaniards for instance, have three different guns, that of the horse artillery is only the light field gun slightly modified. The disadvantages of three distinct natures are self-evident.

ii. This is not at all uncommon. It is what we had in the days of the 16- and 9-prs., it is what the Italians have now, and practically, as I have said above, the Russians and Spaniards. It is, at first sight, tempting, but it has its drawbacks. The difference between the light field and the horse artillery is very little more than the weight of the gunners carried, and that is not enough. If the horse artillery is to be free to move with cavalry, and you give your field batteries the same equipment, you lose power in the latter. There is also the disadvantage of having two sorts of field batteries, a very serious one in the British Service.

Continental nations can tell off so many heavy and so many light field batteries to an army corps or division, and there they remain. All our batteries are on one list for general service, and I think it would add considerably to the difficulties of our unavoidably complicated mobilization to have to arrange for the proper proportion of each, in addition to meeting the ordinary requirement of relief and such affairs as the recent sending out of a battery to Egypt.

iii. The third proposal leaves the field artillery uniform, but splits up the horse artillery. The uniformity of the field is something gained, and it may be said that the H.A. batteries of the corps artillery do

not require the same mobility as those of the cavalry divisions, that carrying no limber gunners will give them sufficient advantage over the field batteries as regards being sent rapidly into action, which is their especial *rôle*, and that having to take their place in the line of battle with the field batteries, they should have the same gun; also that it would complicate matters unduly to have to carry two sorts of ammunition for the corps artillery. I admit the weight of these arguments, but I believe that those on the other side are stronger.

To begin with, all that I have just said as to the disadvantages of diversity of equipment for field batteries applies with even greater force to the horse artillery. We have got very few batteries. How then is it to be arranged, that whenever one is wanted the right sort is available? But far more important than this mere matter of convenience are the tactical considerations which diversity of equipment involves—

a. Without doubt the cavalry will be reinforced from the corps artillery when a cavalry action is expected. The batteries sent on this duty will be expected to show the same mobility as those belonging to the cavalry divisions. If they have a heavier equipment how can they do so? And where are they to get ammunition from? There will be none for them in the cavalry divisional columns.

b. Equally certain is it that in great battles the batteries of the cavalry divisions will join in the general line of the corps artillery. But if they have a different gun, they will be unable to draw ammunition from the corps columns.

c. The cavalry divisions, when acting independently in front of the army, will probably often get out of touch with their own ammunition columns. Their horse artillery should then certainly be able to fill up their wagons from the nearest corps ammunition columns. They cannot do so if they are armed with a special gun.

d. If the cavalry divisions are used in the bold way which seems contemplated, the batteries belonging to them will most certainly require relief. This can only be given by interchange with those of the corps artillery, as is the case between the regiments of the cavalry divisions and divisional cavalry; but if there are two sorts of horse artillery this becomes impossible.

e. Will not the batteries of the corps artillery require all possible mobility, even for their own work? Not only to ensure their early arrival on the field, but to facilitate the execution of wide turning movements?

Finally there is a "moral" side to the question. Prince Kraft, in his letters on cavalry, arguing against the formation in peace of special cavalry divisions and divisional cavalry, says: "From this arrangement would, in course of time, spring two kinds of cavalry, the cavalry divisions and the divisional cavalry. The former, being organized in large units and living in an atmosphere of its own, would, after a certain time, look down with a sort of superiority on the isolated regiments which were told off to the infantry divisions, and the army would come to form an idea that there were two classes of cavalry, and thus a distinction would be drawn, which could in no way assist the general development of the arm. For

nothing but a comradeship of the entire arm, animated, however, by emulation, can forward the development of the arm as a whole." Does not every argument apply with even greater force against the splitting up of the horse artillery?

I am confident that such a division would be most unpopular with those most nearly concerned—the officers of the horse artillery themselves.

iv. This seems to me at once the simplest and the most satisfactory solution. Having two guns at all must always open the door to a chance of sending the wrong ammunition; but there is least chance of a mistake by making one the field, the other the horse, artillery gun. It is the easiest remembered distinction, and appeals to those most ignorant of technicalities.

v. Here I am afraid I am treading on dangerous ground. We have gone further than any other great Power in the direction of uniformity. We have got one gun. I think I may safely say that the experiment has not been a success. I hope we shall soon see the end of it, and it is scarcely likely to be repeated.

To sum up, I am of opinion that two natures of field guns are necessary, but not more, and that the best division to make is the natural one between horse and field artillery.

Uniformity of Calibre.

Immediately another question requires to be solved. Are these guns to be of the same calibre? It is a most difficult question. There are very strong arguments for and against. Those who are in favour of uniformity say, that it is of the utmost importance that ammunition should, on an emergency, be interchangeable. This is, no doubt, very desirable, but does uniformity of calibre really give it? It is not as if the shell and cartridge were of the same weight. Range tables cannot be made out in the heat of action, and, therefore, except for case shot, I can really see very little practical advantage, while any compromise of this sort entails a certain loss of power. Suppose our guns are respectively a 12- and 16-pr., there can be no doubt that what is the best calibre for one will not be so for the other, and that if you strike a mean, it is the best for neither.

I imagine that the cases would be so rare when this uniformity would be useful, that it is not worth the sacrifice; and I, therefore, consider that in creating a new equipment, both the field and horse artillery gun should be made of the design best suited for the work required of it without reference to the other.

Tactical Considerations which are of Universal Application.

To turn now more to detail. There are two main questions which must be settled before anything else, for they are tactical points, and must be put before manufacturing details. We, I am afraid, have not always done this. They are—

1. The weight behind the splinter bar.
2. The number of rounds per gun to be carried.

1. The first is of the most supreme importance. Every endeavour must be made to prevent theorists overloading our horses. An old smooth-bore of Waterloo days, *in action*, is more useful than the "best field gun in Europe" stuck fast in a ploughed field half a mile in rear. At the battle of the Nivelle the Chestnut Troop of Horse Artillery was the only battery which succeeded in overcoming the difficulties of the ground soon enough to share in the attack on the French centre. Here they silenced eight guns which had checked our infantry; and later rendered essential service in driving the French rear-guard from their position covering the bridge of St. Pé. Major Davidson, describing this battle at the R.A. Institution last week, said that he very much doubted whether the Chestnut Troop, as at present equipped, could do the same. There is no good shutting our eyes to the fact. Our horse artillery, hampered with nearly 40 cwt., cannot do what our grandfathers did with 28 cwt. Eight or nine years before this, in 1804, a committee unanimously condemned the French material of that period as too heavy, although its weight was only 37 cwt.—lighter than our 12-pr. Modern science has not increased the powers of our troop horses: the necessity for mobility is probably greater than ever, and the soldiers of those days had had more practical experience of war than falls to the lot of many.

To turn to more modern times. In the battle of Wörth:—

"The 4th heavy battery of the XIth Corps could at first bring only four guns into position at Gunstett; the other two could only be got up by increasing the teams (weight of equipment 36 cwt.)," and, later in the same day, "the 5th heavy battery, when it took position near Elsasshausen, only at first brought up one gun, then two; the rest were stuck in the mud."

Again, of a Bavarian battery, "the heavy ground prevented its following the infantry to support their attack," prevented it, indeed, from performing the most essential duty of field artillery.

It is not the guns alone. We shall be very little better off with a light gun and a heavy wagon. The wagon must accompany its gun. Let us look at the results of our heavy wagons in war. In Afghanistan it was often necessary to put twelve horses in the wagons. In Egypt the guns of the horse artillery at Kassassin were left absolutely without ammunition at a very critical time, through the impossibility of getting the wagons up. And to refer again to the battle of Wörth, we read of a German horse artillery battery in the attack on Elsasshausen, "it was in want of ammunition because the wagons could not climb the hill." At last one was got up, but only, as in Afghanistan, by hooking in twelve horses (weight of wagon 38½ cwt., only ¾ cwt. heavier than our 12-pr. wagon).

In the early part of the century, when we had the experience of long-continued war to guide us, the wagons of our field artillery were rather lighter than their guns.

Do not let us then forget that, as the strength of a chain is that of its weakest link, so the pace of a battery is that of the slowest carriage in its fighting line.

What weight should we lay down as the limit for horse and field

equipment respectively? remembering that the weight, as they come out of the arsenal, does not include that accumulation of odds and ends which it seems impossible to avoid. I think, myself, that we should say 30 cwt. for horse artillery and 37 for field—the wagons the same as the guns. But whatever the weight, it should be settled by *field artillery* officers; and, once settled, should be unalterable as the laws of the Medes and Persians.

2. *The Number of Rounds per Gun to be carried.*—Let us look at how the artilleries we may have to meet are provided in this respect:—

Country.	Number of rounds per gun with the battery. Horse artillery.	Field artillery.
England	108	108
Austria	152	128
France	156	131
Germany	135	135
Italy	143	130
Russia	130	150

And an extra wagon has recently been added in Germany.

It is a very serious thing to think that our horse and field artillery may have to contend with foreign batteries carrying, on an average, thirty rounds a gun more, and in every case (except the Austrian and Italian horse artillery) firing a heavier shell.

To turn again to the experience of war, as to expenditure—

At *Vionville* two German horse artillery batteries fired over 190 rounds a gun, and the average of the 23 batteries of the IIIrd and Xth Corps was 94 rounds a gun.

At *Gravelotte* the average of the 39 batteries of the Guard and Xth Corps was over 102 rounds a gun, and they did not come into action (the Guard Corps, at least) till two o'clock.

The French batteries at *St. Privat* had only 100 rounds a gun, and were obliged to cease firing from want of ammunition.

At *Sedan* the 10 batteries of the Xth Corps fired 132 rounds a gun.

Colonel Walford, in a very interesting lecture on this subject, has calculated that the corps artillery, in the case of an army corps marching on one road, would be in action nearly four hours before the corps ammunition column could get up; while the amount of ammunition batteries carry would only last three hours! But this is supposing there is no block to the advance of the ammunition columns. What says Prince Kraft:—

"You cannot safely reckon, in the case of decisive battles, where such great masses of troops are collected to take part in the decision, upon the columns being able to make their way through the combatant troops during the very day of battle. We must, therefore, fill up the limbers and wagons of the batteries with as much ammunition as they can possibly consume during the whole length of a day of battle."

Compare this with the following from a manuscript book for instructors at the Royal Military Repository:—

"The number of rounds per piece required to sustain an action of some duration has been assumed as a criterion to regulate the ammunition wagons to accompany a battery independent of reserves"—and here are the numbers of rounds per gun: 12-pr. 184, 9-pr. 166.

The agreement of the two passages, both written when the recollections of the battlefield were fresh in men's minds, is perfect. In one case the author was an English gunner; the date, 1830. In the other a Prussian, writing half a century later. And yet we, who call ourselves practical people, seem content with a paltry 100 rounds a gun. 150 is the least with which we should be satisfied.

Part II.

Guiding principles in the choice of

A. Gun.
B. Shell.
C. Carriage.

A. *The Gun.*

The great question of the day is, no doubt, what Captain Bethell has well described as "The Battle of the Velocities." I have endeavoured to put, as briefly as possible, the advantages and disadvantages of a high muzzle velocity; for on this all else depends—calibre, weights, and even nature of shell. I shall take the advantages claimed for the high muzzle velocity first; they are—

i. Flat trajectory.
ii. High bullet velocity (for shrapnel).
iii. Better ricochet effect of bullets.
iv. Better effect with case shot.
v. Increased accuracy.

While on the other side we must place—

i. Destructive effect on carriage, requiring complicated and heavy gear to resist it.
ii. Excessive recoil, requiring complicated and heavy brakes.
iii. Inaccuracy, due to excessive jump.
iv. Irregularity of burning of fuze.
v. Necessity for very strong shell.
vi. High velocity of rotation.
vii. Small calibre.
viii. Light shell.

To consider these in order.

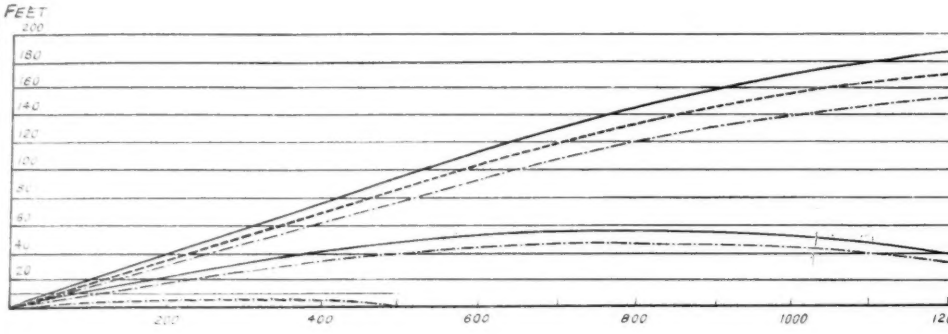
i. *Flat Trajectory.*—There is something "taking" about a flat trajectory, and it is often, I am sure, thought that the trajectory of a high-velocity field gun is something similar to what is called a "flat trajectory" by a rifleman. How fallacious this is, is very apparent

Trajectory of Lee-Metford rifle at 500ˣ

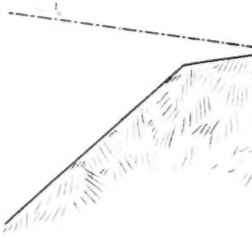
" " 12 pr. B.L. gun M.V. 1710 f.s. at 1500ˣ and 2500ˣ

" " " " " " 1550 " " " " "

" " " " " " " (with 15 lb shell) at 2500ˣ



Vertical scale to horizontal as 5 to 1.



Method of searching interior
High Explosive Shells

Harrison & Son

FIG. 1.

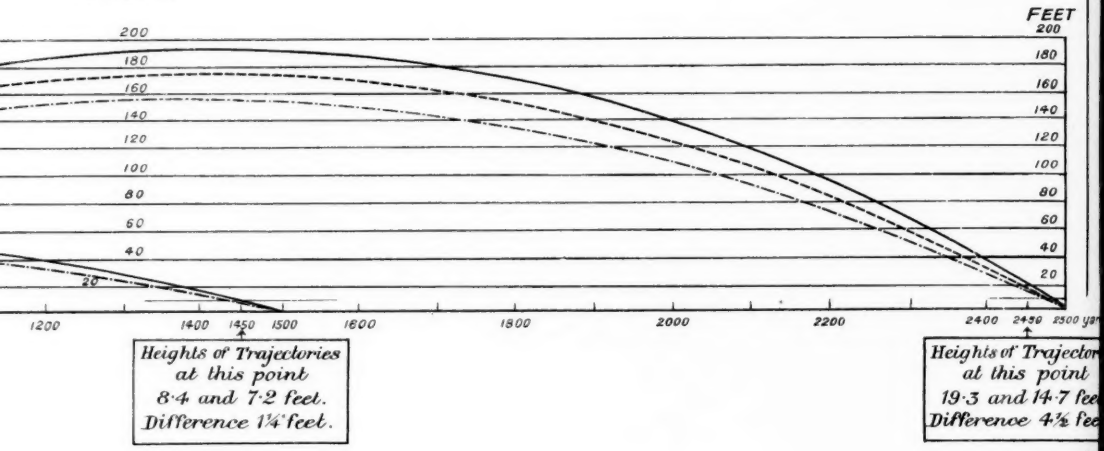
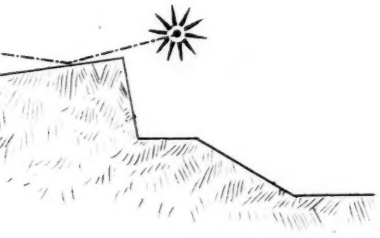


FIG. 2.



erior of Field Works by Fire of hells with Percussion Fuze.

on & Sons, Lith. 5, Martins Lane, W.C.

from the diagram (Fig. 1), which shows the trajectory of the Lee-Metford at 500 yds. (for which I am indebted to the courtesy of Captain Mayne, of the School of Musketry), and that of the Service 12-pr., with a muzzle velocity of 1,710 f.s. at 1,500 yds.—ranges which, I think, may fairly be put side by side.

The trajectory of the rifle is really flat, while that of the gun should certainly not be so described, in spite of its high muzzle velocity. To show how small, in reality, is the advantage in this respect gained by this high muzzle velocity, I have drawn out, on the same diagram, the trajectory with a muzzle velocity of 1,550 f.s. You will see that there is very little difference indeed between them. The whole range is the dangerous distance with the rifle; the length of this distance with the field gun is very small. But in reality the dangerous distance is that covered by the bullets of a shrapnel, and the position of the burst is therefore the important point. On the diagram you will see that for a burst 50 yds. short, the difference in *height* of burst with muzzle velocity of 1,710 and 1,550 f.s. at a range of 1,500 yds. is only $1\frac{1}{4}$ ft.; at a range of 2,500 yds. only $4\frac{1}{2}$ ft.

ii. *High Bullet Velocity.*—As a matter of fact, bullet velocity depends not on muzzle velocity but on the remaining velocity at the point of burst, and the difference between these falls off very rapidly as the range increases. The table gives the remaining velocity at different ranges for muzzle velocities of 1,710 and 1,550 f.s. respectively, with a shell of the same weight.

Range.	M.V.	M.V.	Difference.
At the muzzle....	1,710	1,550	160
„ 1,000 yards...	1,253	1,145	108
„ 1,500 „ ...	1,092	1,023	69
„ 2,000 „ ...	993	945	48
„ 2,500 „ ...	919	877	42

Which shows very plainly that, as General Nicholson wrote some years ago, "muzzle velocity is not a true measure of remaining velocity."

iii. *Ricochet.*—This may be true, but I very much doubt whether, for ordinary ground, ricochet effect is of any great importance.

iv. *Case Shot.*—In reality, the small case shot bullets lose their velocity so quickly, and, in consequence, have so short a range, that the difference is scarcely perceptible.

v. *Accuracy.*—What do we mean by accuracy? At a vertical target the high-velocity gun may be superior; but has it any great advantage in accuracy of ranging? I believe not; and there is the positive disadvantage that a very slight inaccuracy of elevation makes so great a difference in range. Officers who have served in 13-pr. batteries do not seem to think that the 12-pr. is in any way more accurate in spite of its higher muzzle velocity.

To turn now to the other side of the question, and consider, in their turn, the disadvantages I have put down.

i. *Destructive Effect on Carriage.*—Of this there can be no doubt.

High velocity is very expensive, for, to counteract this destructive effect, we have been obliged to sacrifice both lightness and simplicity.

ii. *Excessive Recoil.*—Undeniable again. With the most absolute locking of the wheels, a high velocity will give a violent recoil, unless the carriage is very heavy. How serious this would be is, I think, hardly generally understood. It is not so much, I mean, in the delay which it undoubtedly causes, but in the absolute wearing out of gunners. We shall see this practically tested at Okehampton in a few months.

iii. *Inaccuracy due to Excessive Jump.*—This is one of the few sins laid to the charge of high muzzle velocity of which it is innocent. It does give the excessive jump; but does this cause any great inaccuracy? For a single gun shooting with plugged shell at a vertical target, it may be so, but for a battery shooting at service targets, so many factors come in that it is inappreciable.

According to the report for horse and field artillery practice in 1892, 46 batteries, armed with 12-prs., practised in Great Britain and Ireland; 12 of these had Mark II carriage (in which the jump is practically eliminated), and their places by figure of merit were 2nd, 4th, 5th, 17th, 20th, 25th, 27th, 31st, 32nd, 34th, 39th, 42nd; or an average of 23rd, exactly half way down the list. The absence of jump does not show any superiority here.

iv. *Irregularity of Fuze.*—This is only what might be expected. It is very well shown by the experiments made with the German equipments at Shoeburyness some years ago. Fired out of its own gun, the German fuze easily beat ours for regularity, but, tried in our high-velocity gun, it was found decidedly inferior to our own.

v. *Necessity for Strong Shell.*—To stand the great shock of discharge with a high velocity the shell must be very strong. If the walls are of cast iron, they must be very thick, and the capacity of the shell is reduced; if of forged steel, the shell, instead of bursting into fragments, simply tears open and becomes useless as a man-killing projectile. I have always heard that the difficulty about the introduction of a ring shell for the 12-pr. was that a shell which would break up properly on burst could not be made strong enough to stand the shock of discharge.

vi. *High Velocity of Rotation.*—With the same twist of rifling high muzzle velocity will give a greater velocity of rotation, a greater scattering of the bullets when the shell bursts, and, therefore, more ineffective bullets.

vii. *Small Calibre.*—To get a high velocity, a gun must have considerable length in calibres. It is quite impossible to increase the actual length of a field gun beyond a certain point (which we have certainly reached, if we have not passed). It is therefore necessary to reduce calibre. A shell of small calibre which is heavy enough to keep any remaining velocity, and large enough to have any effect, must be very long. The great disadvantage of a long shell is that it entails a sharp twist of rifling, which gives a high velocity of rotation, the disadvantages of which are enormous for shrapnel. The centrifugal force scatters the bullets laterally, and, as the velocity of

rotation is almost constant, while the remaining velocity decreases rapidly, this scattering effect becomes more marked as the range increases. We suffer from this in our 12-pr., which I am credibly informed was made with its sharp twist of rifling to fire a very long double shell. The truth, no doubt, about the 12-pr. is that it was not made for a shrapnel gun at all. Certainly we have not succeeded in getting good shrapnel effect from it.

Look at the question of twist. Although the 12-pr. is a great deal the longest gun, it has a twist far sharper than the average.

England....	1/28	
Austria....	1/45	
France	1/26	
Germany...	1/50	average 1/40.
Italy.....	1/46	
Russia	1/36 and 1/40	

viii. *Light Shell.*—The power of being able to fire a much heavier shell with the same strain on gun and carriage is an enormous advantage for the lower velocity. Not only has a heavier shell greater carrying capacity, but, not losing its velocity so quickly, it soon catches up the difference in muzzle velocity—a well-known instance occurring in that of the 12- and 13-prs. with the same calibre.

	12-pr.	13-pr.	Difference.
At the muzzle....	1,710	1,595	115
„ 1,000 yards...	1,253	1,195	58
„ 1,500 „ ...	1,092	1,060	32
„ 2,000 „ ...	993	974	19
„ 2,500 „ ...	919	914	5
„ 3,000 „ ...	356	862	6[1]

Are we then to have a high velocity small-calibre gun, or one firing a heavier shell with a lower velocity?

I believe I shall be expressing the general opinion of field artillery officers, when I say that the advantages of a high muzzle velocity are in no way commensurate with its practical disadvantages. I admit that the tendency on the Continent seems to be in the direction of high velocity. But we have tried it; let us use the experience we have gained, and not follow blindly in the footsteps of those who have only theory to guide them.

B. *The Shell.*

1. *General Requirements.*—What do we want for field artillery? I should put it as follows:—

i. A shell which will give a clearly visible burst for ranging purposes.

ii. A shell which will give for its weight the greatest number of man-killing fragments.

[1] In favour of the 13-pr.

iii. A shell whose fragments will cover a considerable space in *depth*. It is well known that correct *line* is easy to obtain, but that correct *range* is difficult.

iv. A shell which shall have destructive effect against troops in ordinary buildings.

v. Uniformity of ammunition.

I have not put down the destruction of earthworks, as I believe it is now generally admitted that that is a task beyond the powers of field artillery.

2. *Considerations of Shell now in Use.*—Let us look at the competitors in the field, and consider their advantages and disadvantages with reference to these requirements.

These are—

Common shell.
Ring ,,
Shrapnel ,,
High explosive shell.
Case shot.

But this latter is of course only for use on special occasions, for which a small proportion must be retained, as its place cannot be taken by a shell which requires any preparation.

The common shell is one of those articles of which we are the sole possessors. Introduced with the idea that it might be effective against earthworks, the 12-pr. common is made of the best forged steel to enable it to contain its enormous bursting charge—three times the weight of that now carried in any field shell, except the Russian 28-pr. But it has been proved to be ineffective against earthworks, and, though its large charge makes the burst easy to observe, there are fatal objections to its retention as a ranging shell, for it does not range the same as the shrapnel, and it is practically useless as a man-killing projectile.

The ring shell is a compromise, a shell with a considerable powder charge, yet arranged to break up into small fragments. Though carrying a smaller bursting charge than a common, these fragments make it preferable to the latter for ranging purposes, and it is so used by most foreign nations.

Shrapnel is, of course, *par excellence* the field artillery shell. Tried first by us at the beginning of the Peninsular War, it has been adopted by all other nations, name and all, and it is rather curious to note the way in which it has pushed its way to the front, even within the last few years.

Ten years ago the general proportion among European nations was 2 common to 1 shrapnel; now they carry an equal number of each. The English artillery has, as befits the regiment of the inventor, shown a very decided lead in this matter. Ten years ago we had 3 shrapnel to 1 common; now we have 4.

I have not space to go into the details of shrapnel construction, position of bursting charge, &c., but there is one point I should like just to touch on, because it is one which frequently comes up in dis-

cussion with officers of the other arms. I have often heard it said that we get a very small number of hits in proportion to the number of bullets in our shrapnel, as if it were possible for all the bullets to be effective on one target. It is forgotten that the bullets spread in a cone whose vertical diameter is the same as its horizontal one, and that, therefore, if the bullets cover a front of, say, 20 yds., a line of dummies 20 yds. long, but only 6 ft. high, can only receive a small proportion of them. Wherever this line is, some bullets must be lost which fall short, and some must pass overhead. It is just this fact which gives the depth of danger zone that renders shrapnel so useful a projectile for the work of the battlefield.

To turn back to the requirements of a field artillery shell; shrapnel undoubtedly fulfils Nos. ii and iii, and it has been proved, though I think it is a fact not generally known, that shrapnel will penetrate any ordinary brick walls, and burst the other side with most destructive effect. If, then, it can be made to fulfil the first, we shall arrive at the great desideratum, uniformity.

As to General Requirement No. i, this is simply a question of smoke. Space inside a shell is very limited, and as much as possible is wanted for the bullets. Is it possible in a small space to get a composition which will give a good smoke? I have no doubt that chemists will solve the question, and once this is done we can use our shrapnel for ranging. What happens now? We are supposed to range with this shell and fire with this; naturally they do not agree. Even if we put up with the small burst, and try to range with the shrapnel, we are not allowed to put the fuze we are going to use afterwards into it. By a piece of economy so paltry as to be almost ridiculous, we are obliged, in order to save the country three shillings, to use another fuze which weighs exactly $\frac{1}{2}$ lb. less; and, as Captain Blunt well said at the R.A.I. last autumn, "The same shell with T. and P. fuzes appeared to range somewhat differently; at all events, it was suspected of doing so, which is nearly as bad."

But, if the common shell is done away with, there will be no excuse for the retention of the percussion fuze, and we shall have arrived at the millennium, *one shell one fuze*. That fuze must be carried in the shell. It savours rather of the manners and customs of "another place" to bring up the utterances of four years back, but I do not think that General Chapman will object to my quoting from a Report written by him at Okehampton in 1889.

In it he says, "That a fuze can be constructed to travel in the projectile for which it is designed is sufficient to prevent us from being content until the present plan of packing and carrying fuzes is abolished."

I have so far said nothing of the latest development in ammunition, the high-explosive shell. It is a subject shrouded in mystery. We know that it has been tried in England, France, and Germany, and adopted in the latter. As to what trials have taken place in England, I regret to say that I have no information, but, as the high-explosive shell is much talked of, I have endeavoured to put together what little I have been able to find out about it. I am especially

indebted to the admirable work of Colonel Langlois, and I think his words on this point will very well bear quoting: "Each nation, jealous of its secret, thinks it ought to throw a thick veil, even for its own army, over the results obtained. We have already said what we think of this course of action—that we consider it very dangerous. It exposes officers and men to the most fatal illusions, and all to the wrong employment of the invention."

The chief characteristic of the high-explosive shell is its very violent action, which tears the shell into very small fragments, and spreads these in all directions.

From the first, it follows that these fragments very quickly lose their velocity, and that therefore the ground covered is very small. Colonel Langlois puts it at a radius of from 10 to 16 yds.

To consider this shell with reference to the requirements I have laid down.

i. *A Clearly Visible Burst for Ranging.*—In this the high-explosive is worse than the shrapnel, for it gives practically *no* smoke. The German Regulations lay down that when firing high-explosive shells the ring shell is to be used for ranging.

ii. *Number of Man-killing Fragments.*—In this the high explosive shell is undoubtedly far ahead of any other.

iii. *Fragments to cover a Considerable Space in Depth.*—This is a quality in which, as I have said, the high explosive is very deficient. It is just this quality of shrapnel which is so valuable for the field, as it makes it so effective against moving objects, and when the range cannot be very accurately found.

iv. *Destructive Effect against Troops in Ordinary Buildings.*—For this purpose the high-explosive is most effective. Its very local action and all-round effect is the very thing for a shell bursting in a room.

v. *Uniformity.*—Considering its deficiencies in (i) and (iii), I can scarcely imagine that high-explosive shells are ever likely to become the shell for general use.

But there are other special powers claimed for these shells.

For the Breaching of Earthworks and the Destruction of Obstacles.—As to this, Colonel Langlois considers that, from what is known, the expenditure of ammunition would be much too large to be commensurate with the results obtained. But further experiments are no doubt required.

For the Attack of Troops sheltered behind Parapets.—In Fig. 2 you will see a sketch showing how, according to the same authority, the all-round effect of the bursting charge may make it very effective against troops under cover. A shell with percussion fuze striking on the superior slope, and bursting just after graze, would completely search the interior. This, of course, would require very accurate shooting.

But do we require more of field artillery in the attack of earthworks than

To deny the parapet to the defenders until our infantry has advanced so close as to mask our fire?

To prevent the reinforcement of the first line? and
To check counter attack?
For all these shrapnel is the most effective.

To sum up, the high explosive shell will give

Increase in power against troops in houses.
Possibility of causing loss to defenders concealed behind the parapets of field works.

While, on the other hand

It is an extra projectile.
A premature burst would probably put a gun out of action; and
For the ordinary work of the battlefield it is not so effective as time shrapnel.

We should, I think, therefore be very careful before we replace any of our very small stock of shrapnel with the new projectile. If it is to be introduced, it should be in addition to the ordinary supply of the battery, and should be carried in a special wagon, as in Germany, which would only be ordered up when required for some special purpose. Above all, let it be thoroughly understood what it can and cannot do, in order that the other arms may not expect from the artillery services which we are incapable of rendering. Listen to this, which I recently cut out of a paper professing to be technical:—

"*A New German Field Gun.*—It is stated that a new field gun has been produced for the German army which possesses several advantages over the weapons at present possessed by any of the European Powers. Now four different kinds of projectile are used, but the new gun would only have one—explosive shell. These are substantial advantages; but a far greater remains in its destructiveness, its powers in that direction being prodigious. The splinters of a shell have been estimated to cover an area of 30 or 40 yds., but those of projectiles discharged from the new weapon cover a surface ten times as great, so that a regiment would in a few minutes be swept away by a single gun." *Prodigious* is certainly the right word; but if the German army expect their artillery to destroy regiments in this wholesale way I am afraid they will be grievously disappointed.

C. *The Carriage.*

I propose to consider the question of carriages under three heads:—

1. The gun carriages.
2. The ammunition carriages.
3. Shields.

1. *The Gun Carriage.*—There are four grand requisites for a gun carriage, in addition to the necessary strength.

i. It must be simple.
ii. It must be light to handle.

iii. It must carry a few rounds.
iv. It must have short recoil.

i. *Simplicity.*—We have lately had what might have been a very terrible example of neglect of simplicity. It is often forgotten that what may work well in the Arsenal, and even in barracks, may behave very differently in the rough work of a campaign. How are the elaborate instructions for the care and preservation of the various parts to be carried out when a battery is turned into a ploughed field at 10 o'clock on a dark night and told to bivouac there? You must have a carriage that will work, even if for a day or two it is deprived of the customary attentions of its limber gunner.

The great question is, Are we to have a hydraulic buffer? Our experience of the buffer so far has been that it has generally worked well; but it is heavy, and there is no doubt that it is a source of weakness. Even in England some batteries have complained of constant leakage, and supposing that any accident does happen either to the buffer or the volute spring, the gun is out of action. For horse artillery I certainly think it is inadmissible. If it will enable us to fire a heavier shell from our field gun I think it may be retained, but only as a necessary evil, to be got rid of immediately the advance of science enables us to dispense with it.

ii. *Light to handle.*—We do so few long days that this is often forgotten, but it is an important point, and I have seen, after a long day's manœuvres, the gunners pretty well exhausted in trying to get the trail of the 12-pr. on Mark II carriage round to limber up. The buffer is a great offender in increasing the weight of the trail.

iii. *Carry a Few Rounds.*—This I conceive absolutely essential, so that if through any accident there is a little delay in the wagon coming up, the gun may not be left without ammunition. Such accidents are common enough on the practice ground, and we should be prepared for them in war. The mere fact that there are a few rounds on the gun ready for any emergency gives a great feeling of confidence, and the value of this cannot be over-estimated.

iv. *Short Recoil.*—Short recoil is necessary not only to economize time, but to save labour. We know how the gunners of Mercer's troop at Waterloo were at the end of the day so exhausted as to be quite unable to run up. It will be interesting to see how the gunners of the present stand the long day's firing we are to have at Okehampton this summer. Many brakes have been tried; none that we have had in the Service have combined the two essential qualities of simplicity and reliability. Combined with a reduction in muzzle velocity, the drag shoe brake will, I hope, solve the difficulty.

2. *The Ammunition Carriages.*—The first thing, I think, that would strike anyone in studying the particulars of foreign limbers is their very much larger percentage of *useful weight*, that is, of weight of ammunition carried as compared with our own. Here are the figures:—

	H. A. per cent.	F. A. per cent.
England	34	34
Austria	44	48
France	29	35
Germany	46	43
Italy	41	41
Russia	40	45

the average percentage being 40 and 42 per cent. respectively for horse and field artillery, while ours is only 34 per cent. I admit that our 5 ft. wheel must of necessity be heavier than their 4 ft. 7 in. ones, but I cannot believe it need be such a monstrosity as it is—62 lbs. heavier than the average horse artillery wheel of these five Powers, and 47 lbs. heavier than their field artillery wheel! Do we not make our carriages too strong? The risk of one occasionally breaking down is, in my opinion, less harmful than the continual waste of power in dragging about this large amount of unnecessary weight. Another cause of our carriage being so heavy is that the ammunition is packed in small, removable boxes, which is not the case with Continental Powers. This is, of course, to facilitate transport by sea, and was necessary in the days when it took six ships to carry one battery. It is now probably no longer so, and I hope that by adopting a fixed box, we may be able to carry a considerably increased amount of ammunition without increasing the total weight.

3. *Shields.*—I cannot leave the subject of carriages without making some mention of shields. After the Boer War there was considerable discussion on the subject in England, and it has recently been revived on the Continent. A French writer has even proposed shields for the infantry to be carried by specially selected strong men.

Many ingenious ideas have been put forward for our shields, and various materials have been suggested, varying from chain armour to wet blankets! The whole question is most clearly put in a paper by Colonel Tyler, which appeared in the proceedings of the R.A.I. in 1886. He there lays down five conditions as necessary for any shield:—

i. It must be carried on the gun.
ii. It must not interfere with the working of the gun or carrying the gunners.
iii. It must be easily put up and taken down.
iv. It must be capable of being carried into action in position.
v. It must resist infantry bullets at 600 yds.

As to the correctness of these conditions, there can be no question. They can, no doubt, all be satisfied, but at what cost? It is in weight that we have to pay for every luxury in the field artillery, and the cost here is very heavy. I believe steel plate has been found to be the best material, and to resist the bullet of the Lee-Metford this must be $\frac{3}{8}$-in. thick. It will then weigh 15 lb. a square foot, and I believe I shall not be at all over-estimating the whole weight, including

the arrangements for raising and lowering, if I put it at $3\frac{1}{2}$ cwt. The question is, Are we willing to sacrifice 23 rounds in order to carry a shield? or shall we do better to trust in our own fire as our best defence?

Part III.

Quick-firing Guns.

I have put off till last the consideration of the introduction of Q.F. guns for field artillery, because the principles which we have been discussing apply in most cases equally to them. It is, of course, impossible, in the limited time remaining to me, to attempt a thorough examination of the question, but I shall endeavour to lay before you the main advantages and disadvantages of any Q.F. system.

1. *Definition.*—And first, what is a quick-firing gun? I am sure you will all agree with me, that I cannot do better than accept the definition of Mr. Nordenfelt. In a most interesting pamphlet published last year in Paris, he writes:—

"We consider that any gun, to bear the name of a Q.F. field gun, should satisfy the following conditions":—

i. Ammunition in metal cartridge cases, with caps like those of small arms.
ii. A breech action so rapid as to cause no delay beyond that necessary for laying and fuze setting.
iii. A breech action as simple as possible, both safe and easily worked.
iv. A carriage provided with both elevating and traversing gear.
v. A non-recoil carriage, so that only the slight correction in laying for the vibration caused by firing may be necessary between rounds.

And then follow details as to weight, &c., into which we need not enter. These, as I have said, I look upon as tactical questions, equally binding whatever the nature of gun.

I propose to consider the paragraphs of Mr. Nordenfelt's definition in order.

i. *Fixed Ammunition.*—In favour of this it may be said that—

The powder is perfectly protected from deterioration, a matter of great importance.

Our undoubtedly slow and clumsy method of firing, in which first the cartridge is pricked, then the tube is put into the vent, and then the lanyard is pulled, is done away with.

But on the other side there is—

Extra weight. With the smaller charges cordite enables us to use, this disadvantage is considerably reduced, but it is a dead weight.

Danger of jams. A thin metal case, with a heavy shell attached to the end of it, is very liable to get put out of

shape, and in consequence jam in loading. I have seen this frequently happen with Q.F. ammunition which has had no rough usage. Until it has been proved by actual trial, I cannot believe that this ammunition will stand the knocking about in the limbers and wagons. The worst part is that when a jam does occur, it is often very difficult to extract the cartridge—with a fuze at one end (from which the safety pin has been withdrawn) and a cap at the other, it is not a thing one cares to treat too roughly.

Danger of explosion in limber. The caps are usually covered by safety clips, but these must be removed before sending the ammunition up to the gun, and I am afraid in limbering up in a hurry they would rarely be put on again.

ii. *Rapid Breech Action.*—Our present service action is very quick. It is not the opening and closing of the breech which delays the fire, but the time taken in running up, laying, and fuze-setting. Possibly, too, it may not be known to many of you what the cost in weight of this little extra rapidity is. The breech action of the 3-pr. Nordenfelt Q.F. gun weighs 45½ lbs., and that of the 6-pr. nearly 78 lbs., while that of the Service 12-pr., firing more than twice as heavy a shell, with double the charge of powder, is only 34 lbs.

iii. *Simple Breech Action.*—No Q.F. breech action that I have ever seen can compare with our Service one in simplicity. By this I do not mean in small number of parts, but in the ease and rapidity with which any damaged part can be replaced. All Q.F. breech actions must of necessity have a strong mainspring, and most of us know how obstinate a strong spring can be. I have often seen men well acquainted with the mechanism of our Q.F. guns experience the greatest difficulty in getting the pieces into their place. Their great weight alone is a considerable obstacle to ease of handling, especially in the field.

iv. *Traversing Gear.*—Traversing gear has had a short life with us. It has been fairly tried and unanimously condemned. Whether any other system would better stand the test of actual work, it is impossible to say, without a long and severe trial; but, with a non-recoil carriage, traversing gear is a necessity.

v. *Non-recoil Carriage.*—A non-recoil carriage would undoubtedly increase the rate of fire enormously; not only would the time actually employed in running up be saved, but the very considerable pause, after the order to fire is given, before the numbers are clear of the recoil and the gun can be fired. Mr. Nordenfelt is quite right in saying that no gun can be called a Q.F. unless mounted on a non-recoil carriage; but any gun can be so mounted. Our service 12-pr., for instance, would be very nearly as fast as a Q.F. if so mounted. This was shown when it was tried against the Nordenfelt 8-pr. When the gun was not run up between rounds, the difference in rapidity was very small. The question is whether this increase in rapidity of fire is worth the undoubted disadvantages of a non-recoil carriage. But first it must be remembered that, in addition

to giving greater rapidity of fire, the non-recoil carriage has several other advantages:—

It saves an enormous amount of labour to the detachments.
It enables us to work the gun with fewer men.
It makes the protection given by a shield (if one is introduced) far more complete.

On the other hand, its disadvantages are very great. They are—

Great increase of weight.
Sacrifice of simplicity.
Necessity for traversing gear, and difficulty of turning the gun suddenly on to a new target. All non-recoil carriages have a plough under the trail, which digs into the ground. This necessitates traversing gear for slight alterations of direction, and makes it very difficult indeed to throw the trail rapidly into a new direction when it is desired to change the target.

2. To turn now to the question of ammunition. Mr. Nordenfelt proposes to obtain the extra rounds, admittedly required with a Q.F., in two ways:—

By firing a lighter shell, and
By reducing the detachments and the number of guns in a battery.

But by reducing the weight of shell you will, I believe, get far more dead weight for the same gross weight of ammunition. In dead weight I include the fuzes, bursting charges, and the cartridge cases.

Let us compare ten rounds of ordinary ammunition for a 12-pr. with twelve rounds of Q.F. ammunition for a 10-pr., and examine the dead weight in each case. The fuze and bursting charge of a shrapnel alone weigh 1 lb., and this is the same whatever the weight of the shell. Putting the metal cartridge cases at 1 lb. each, we have in dead weight with 10 rounds of ordinary 12-pr. ammunition 10 lbs.; but with 12 rounds of Q.F. 10-pr. ammunition there are 12 lbs. for fuzes and bursting charges and another 12 lbs. for cartridge cases, altogether 24 lbs., or a difference of a stone in these few rounds.

To the second proposition, that of reducing the detachments at the guns, and the number of guns themselves to four, keeping a battery at its present strength in men and horses, and utilizing those saved for extra wagons, there are, I am afraid, two very strong objections, both on moral grounds:—

First.—The difficulty of persuading our friends of the other arms to allow wagons to get in front of them going into action. I think we shall have to use our utmost endeavours to get our six wagons up.

Secondly.—The zeal for economy which about this time of year possesses every Secretary of State for War. How long, I wonder, should we have all those wagons? There is nothing romantic about them to stir the newspapers, and I am afraid that their teams would soon be sacrificed to the exigencies of party government.

3. A few words as to this great rapidity of fire. The idea seems to be that a Q.F. battery should lie in wait for the enemy, having previously prepared a certain number of rounds (how their

fuzes are to be set before trial shots have established the right length is not explained), and that then, at the given moment, they should overwhelm him with a very rapid fire. This is the fire by "gusts" or "squalls," of which we have heard a good deal lately. It is, I admit, a very taking idea. Is it practical? I wish I could think it; but my experience of the practice ground goes all against it. Do not let us forget that the duty of the artillery is to *hit;* would these gusts of fire conduce to *hitting?* Rapidity is of great importance, but accuracy is of greater. I confess that I think we are far more likely to get good results in the same time by a smaller number of larger shell, fired with careful observation. Let me read to you an extract from von Löbell's annual report on military affairs, or rather from a translation of it, which appeared in the Journal of this Institution. It admirably expresses what I believe to be the truth in this matter:—

"Our view is that artillery now, as before, must adhere to the principle of observing every shot, even after the ranging is completed. The rapidity of fire will, therefore, not be materially altered. . . . If the ranging is incorrect, the rapid fire that follows is not only useless, but actually harmful; for it costs much ammunition, makes the recognition of the error committed more difficult, and *causes unsteadiness among the gunners.*"

What says the Commandant, Okehampton, in last year's report?

"No rate of fire, however rapid, can be considered effective unless it is regular."

In conclusion, I can only hope that I may have done a little to advance the cause of those who believe with me that for any field artillery equipment two qualities are *essential*—simplicity and mobility.

Colonel T. B. Tyler, R.A.: I think, sir, we may congratulate the lecturer on the amount of information he has brought before us and on the great force and lucidity with which he has expressed it. The information is valuable not only to artillery officers but also to officers of other arms of the Service. Lately, the veil in which it has been customary to enshroud the doings of the field artillery has been happily swept away, and we have the officers of other arms of the Service taking the same intelligent interest in our welfare and our doings as we do ourselves. The lecturer states at the beginning of his lecture: "It has been my object in preparing this paper not to advance original ideas, but to pass in review the main principles on which the re-armament should be effected, in order to facilitate such discussion." Therefore, if anyone thinks the question at the head of the lecture is not fully answered, I think for one that it is better to furnish such information as will promote the growth of knowledge than to advance theories which may prove afterwards to be untenable and have to be withdrawn. The lecturer has told you that when a gun is designed, the first thing to be considered is "the weight behind the splinter bar" and "the number of rounds per gun to be carried"; the second thing is the shell; and the third thing is the carriage. Now, the 12-pr. gun was made first. I have never been quite able to discover the parentage of the 12-pr. I am inclined to think it was partly accidental. It was found when the gun was made that it was a very good gun at a vertical target, that it was a good rifle, but its shrapnel effect was not considered. Having got the gun, we had to make the carriage and shell, and we found that, on account of having inverted the order of things, we got into an experimental morass from which, as yet, we have never emerged. But, in considering the second question, shrapnel shell, we are confronted by this difficulty, that we have no standard for shrapnel. It is not laid

down anywhere what shrapnel can do and what it ought to do. We are not alone in that ignorance; I was reading only a few days ago a German paper on military matters, and the Germans are also plunging about in the same quagmire. But I think the sooner we do make up our minds as to what shrapnel should do, and should be, the better, because up to the present time I cannot see that any improvement on the effect of the 13-pr. muzzle-loader has been made at the targets since the introduction of the breech-loader. As to the question of muzzle velocity, there is still a good deal of disagreement. I am no opponent of a high muzzle velocity in its proper place. In the navy and in coast defence, where fixed carriages are possible, a high muzzle velocity is a most excellent servant, but when it comes to field carriages, the disadvantages which the lecturer has put before you seem to me to be very strong against it. He has pointed out to you the difference between two trajectories, the 1,550 and the 1,710. He has shown you that there is no great difference between them. He has also shown you that the word "flat trajectory," as applied to artillery firing, is a misnomer and misleads people altogether; they think a flat trajectory, which is simply the path of a bullet through the air, is like the trajectory of a rifle bullet, a source of danger throughout its whole progress. The highest point of the trajectory of a 12-pr., I think, at 1,000 yards, is 17 feet; at 2,000 yards it is 90 feet; and at 4,000 yards, 500 feet. I do not think anybody can call that a flat trajectory. The real point of danger of the shrapnel is its point of burst and afterwards its cone of dispersion. The lecturer has shown you that it is only a matter of 2 or 3 feet in the difference of the height of burst, and really for practical purposes the cone of dispersion is almost the same. The greatest evil of high velocity is the recoil. We have, many of us, been reading with interest the work of Major May on the achievements of field artillery. We have followed the field artillery through the wars of Frederick, the wars of Napoleon, through the Franco-German war, and up to the present time. Those who are older have regretted, I have no doubt, that such fortune has not befallen them, and the hearts of the younger ones probably beat high with the hope that some day they will be able to emulate the deeds of Senarmont in the wars of Napoleon, of Grasse, and of Gnügge in the Franco-German war. I would ask, when you consider these great exploits, when you consider how Senarmont pushed his guns into the defences of the enemy, how Grasse worked the small remnant of his battery till there were only four men and one gun left—how could these heroic deeds have been done if these men had to deal with guns which recoiled 10 and 12 feet at every round? It would have been impossible to carry them out. These feats will be attempted, no doubt, in future wars, but unless the violent movements of our guns are controlled, such deeds, I am afraid, will not be repeated. To my mind the recoil of a field gun should only be about 3 feet, and any gun, however good in other respects, should be rejected of which the recoil, on ordinary grass land, is more than that. Mr. Hotchkiss proposes to stop recoil with a spade on the trail which digs into the ground. I have not seen it; no doubt he is right, but our experience of the spade is not very encouraging. In the first place, when it acts it makes traversing impossible; and in the second place, we found that practically it did not act well at all; it made a groove and nothing more. The lecturer has alluded to high-explosive shell, and they, no doubt, will play their part in future wars, but at present all we know about explosive shell is that when they burst in the gun they put the gun out of action. I do not think that we shall adopt a shell which bursts our guns, because we shall never feel confidence in it, and we have yet to find whether we can make a shell with so small an amount of explosive in it that it will do the work well at the target, and yet will do no harm to the gun if it should burst prematurely. The question of shields I approach with some delicacy. I have known something about shields. I once invented a shield. It was not quite successful: it had some virtues, but several defects. One of the defects was that it would not keep the bullets out; and the Ordnance Committee thought the objection a fatal one. I am bound to say there was some force in their argument. I think the lecturer has stated that a shield to keep out the present bullets would weigh 3½ cwt. Soft steel has not the great power of hardened steel, and steel has been brought to great perfection by Messrs. Harvey and Tresidder. Therefore it is possible, if shields should be revived—and I believe they will be—that a thin plate may be so hardened that it may

keep the bullets out. A few words with regard to rapidity of fire. On account of recoil and our rather clumsy method of handling the gun, we do not get a sufficient rapidity of fire. At Okehampton last year, after the fuzes were established, we only got a little over four rounds a minute. That is too slow. There is no doubt we ought to get up to six rounds a minute,[1] and I believe we shall do so. On occasions, at a moving target with the fuzes set and the sights fixed, we get up to as much as eleven rounds a minute. The Germans claim that they can fire their guns for a few rounds at ten; practically that is about the same. I think there was only one battery that got up to eleven, and a good many were nine and ten, and I should think that is about the greatest rapidity that ever could be got for aimed fire; if you got beyond that I think it would be quite impossible to insure aimed fire. The gun of the future is rather a difficult thing to speak about. There is no doubt the tendency is in favour of Q.F. guns, but Q.F. guns are, yet, impossible. We are not ripe for them; we do not understand enough about them yet. I believe, if I may use the term, we shall probably grow into Q.F. guns; but I think we might make our gun a very much quicker loader than it is. If everybody were to set to work and use all his endeavour to simplify the operations of loading the gun, we should be able to fire a great deal more quickly and a great deal more easily. Now, there are many improvements in a small way going on now, and I have no doubt that in time these small things will conduce to very considerable results. But, above all, in the gun of the future we must reduce the recoil. We shall never be able to keep up rapidity of fire if we do not reduce the recoil. And we must make good shell. It is sometimes not realized that a moderate gun with a good shell is a very much better and more reliable weapon than the best gun in the world and a moderate shell. I would also require in the gun of the future that the tendency to simplicity, which I am glad to say is returning, may always be considered. We have gone into complications and we have extricated ourselves from them. We are coming, I am glad to say, in the new guns being constructed now for the horse artillery, more and more to the old idea, that we must have simplicity.

Colonel J. B. RICHARDSON, R.A.: I am sure we must all agree with Colonel Tyler as to the merits of this lecture. It has put a number of most useful points before us for discussion, and I believe the main object of lectures here is to elicit opinion. With regard to high velocity of rotation of shell, the lecturer has not said very much as to why that gives an absolutely unfavourable effect; a great deal might be said on that subject. Then there is the endless question of fuzes! In the shrapnel before us we see that the fuze is about one-eighth as big as the shell, but it has little man-killing effect. Then, again, we come to smokeless powder and cordite, and to "the inaccuracy due to excessive jump." These are all burning points, upon which many of the artillerymen present should have something to say. I do not propose to go into all this, though I might say much, because I think, on the whole, that the lecturer is leading us on a wrong scent, and I do not know that we are any of us, even now, very clear as to what his views are as to the gun of the future. Nevertheless, one point made by the lecturer is a point on which we cannot agree too much with him, namely, his depreciation of the craze for high velocities. Colonel Tyler said that he did not know how the adoption of high velocity came in, but it appears to me to have been the result of the too common practice of committees witnessing practice from the wrong end of the range; they look at the gun end instead of the target end, and thus, I think, mistakes creep in. The poor shrapnel effect of a high-velocity shell must have been exhibited to those who brought out the 12-pr., if they had only tried something else than shooting at an upright dummy of wood. They took the vertical target as the measure of the power of the shell, instead of satisfying themselves that the smallest cover protected men lying down from the effects of high-velocity shell. The high-velocity rifle bullet often goes through slight cover, and is very

[1] "Rate of Fire" is the number of rounds fired per minute by a six-gun battery after the fuze is established: thus a rate of six rounds a minute means that each gun fires once in a minute. Ranging rounds are not included in the calculation.—T. B. T.

effective afterwards, but the shrapnel bullet does not. You may see these bullets lying about on the practice ground without a dent on them, a very large proportion having done no work at all. History is always repeating itself, and it is a very remarkable fact that under the strain of actual war a desire for howitzers always creeps in. After the Peninsular, and nobody had more experience of war, perhaps, than the old Peninsular people, what seems to us now to be a most faulty arrangement, obtained. These great wars led to the use of batteries with two types of ordnance, guns and howitzers. I joined in such a battery, and it seems to me quite the other day that we did away with them—howitzers and guns in the same battery. Yet, with this system in vogue, it is remarkable that very little was heard of the difficulty of supply of ammunition. A combination of guns and howitzers, which has stood this test of war, has not been noticed by the lecturer. I think he too lightly puts that aside, considering it was war experience that brought it in. He suggests that two sorts of guns only are required, one for the horse artillery and one for the field artillery. I differ from him. I think we are apt to treat the necessity for uniformity of weapon as too important, treating a small number of batteries as if we were going to put a million of men in the field, instead of the poor little army we generally fight with. We are always copying the Germans and other nations who deal with very large armies. It is extremely unlikely that we shall ever put these enormous unwieldy armies into the field, and therefore we might have something really powerful and better than foreign nations have. I believe that howitzers are as necessary now to us as ever they were in bygone days. Again, those who have witnessed much firing with high-explosive shells will, I think, hardly agree with the conclusions that the lecturer has arrived at in this matter. Some years ago I had to carry on a good deal of work with high-explosive shells, and I believe that I was the first to recognise the terrible effect these shells would have if used as shrapnel; at any rate, I was one of the first to put forward the idea of the high-explosive shell being used in the field. I think a high-explosive shell might be used in lieu of all other shells, and *there* we should have uniformity to an extent never before attained. That is the line, in fact, uniformity should take. The idea was looked on as extremely visionary at the time by our own people. Somehow or other, foreign nations do not quite look at it in the same light, though it was not encouraged at home. If you fill a shell with sufficiently powerful high explosives, the shell is certainly torn into very small fragments, but those fragments are projected in a violent manner in every direction, searching the ground very thoroughly, to a very considerable distance. I am not at all sure that the effective area covered by the fragments of high-explosive shell, being nearly a circle, would not be larger than the area covered by our high-velocity shrapnel bullets, and I do not think this circle would have any blind centre which the cone of the high-velocity shrapnel, spinning round very fast, has. The moral effect of these high-explosive shells would, I think, be very great. It is very unpleasant, indeed, to be in their neighbourhood. There might also, with such shell, be very little difficulty in obtaining a visible burst. We have been trying now for some time to get a good visible burst for shrapnel, without marked success, but possibly the employment of high explosives might enable a very visible burst to be got, and there is great langridge effect. It possibly might not be necessary to use so much high explosive as to tear the shell into very small fragments, but I do not think that has been at all worked out. With a less muzzle velocity there is very little chance of bursting a high-explosive shell in the gun. The lecturer lost sight of that. You can easily burst a high-explosive shell in a gun when you fire it at a high velocity, but at a low velocity there is comparatively very little danger. With all this, I do not think a small 12-pr. high-explosive shell will ever be got to do much more than a good shrapnel. A 12-pr. shell is too small altogether, and for that reason I urge the necessity of howitzers. I think we shall have to come again to howitzers, as of old. By "howitzer" I mean a short light gun, throwing a heavy shell at a moderate velocity. I am not talking about using high-angle fire, but a short handy light gun will meet many of the lecturer's objections, and will throw a large shell at sufficient velocity. High velocity is not wanted at either end of the range for a projectile that acts in every direction. High muzzle velocity was adopted under the false impression that in consequence the bullets would obtain a high velocity at

the other end of the range. The lecturer takes a very gloomy view of quick-firing guns. I think he has in his mind the very high velocity of existing quick-firers, but perhaps a low-velocity quick-firing howitzer could be produced without any of the disadvantages, or very few of the disadvantages, he details. Past experience shows us that there is a change of armament about once in every ten years. We know that when the 12-pr. was brought out it was called "the best gun in Europe"; it was even said that we had arrived at finality. Yet I do not think it has ever been very satisfactory to artillerymen. I never heard it spoken of very enthusiastically, except when it first came out. Field artillery are remarkable for always longing for a new thing; they think it must be better than the thing they have. Yet this "best gun in Europe" never made anything like as good practice at considerable ranges as its predecessor, and I think that this vaunted high-velocity gun will have to go the way of the rest. Now if the fact that we always change types of guns after a certain number of years were only realized and prepared for, I think the English artillery, which, I am proud to say, used to lead other nations, would not be so constantly following in the wake of our neighbours as it is now. Let us recognise that changes are inevitable, and prepare for them. As soon as the necessity for re-arming arose, as soon as we were at all passed by foreign nations, we ought to be ready to come out with a new thing and a better thing at once, instead of following behind. The personnel of our artillery is, I think, altogether unsurpassed. I do not think there is any question about that, and I believe there are still plenty of artillery officers who are capable of giving a lead to the artillery of the world, as the Shrapnels, and other great names on our rolls, did in the past. All that is necessary is that an encouraging hand should be given to scientific artillery officers. In past days, when we led, artillerymen, who knew what was wanted, controlled the manufacture of the guns. Now the nation has seen fit to take away the control from the artillery and to put it into civilian hands. It may be better: the nation pays more for it, so it ought to be better, I suppose, but I think the artillery officers of the present day do not get the encouragement that was given in the past to devise, bring out, and do better things. If they do bring out improvements, they hear little about them in their own names. I hope the manufacture will come back to the artillery, who realize what is wanted, some day. I think it will be found it will be for the good of the State that it should.

Major-General H. C. WILKINSON, C B: I think it is only right that a few words should be said from the point of view of the infantry and cavalry. For myself, as both an infantry and cavalry officer, I thank the lecturer most heartily for having removed from my mind, at any rate, one idea which appears to be erroneous, and that was that high velocity was of the first importance. It certainly has a very great moral effect on troops, but the lecturer has proved conclusively that at 2,500 yds. the "remaining velocity" of the low-velocity shell exceeds that of the high, and that settles the question. There is one thing which I think we ought to make a point of getting for the horse artillery guns, and that is extreme mobility, so that they may be able to accompany the brigade or corps of cavalry upon long, wearying, and continuous marches. It is no good having powerful guns with a large supply of ammunition if their weight causes you to lose the fleeting opportunity which often decides the fate of the day. From the cavalry point of view we want to have guns that can keep up with us, guns that are able after a long night's march to come to the front and effect the surprise which has been the object of our undertaking, and that, I feel sure, cannot be done by heavy guns. Further, they must be guns that are able to fire many rounds in a few minutes. We know that the opportunities of horse artillery with cavalry are extremely fleeting, and it may make all the difference if they can fire two or three rounds more from each gun on such occasions. It may just alter the whole effect of the cavalry charge. I therefore think every exertion ought to be made by those charged with the duty of providing the nation with guns, to obtain a horse artillery gun that is light, and that has the power of extremely rapid firing. Heavy guns can certainly not be worked with cavalry. It is now certain that horses, when properly cared for, managed, fed, and trained, can do from 50 to 80 miles in twenty-four hours. I look to the day when this may be a recognised fact, and when wide flanking movements will be made by cavalry and horse artillery

which will probably often decide the fate of a campaign. I do not venture to touch upon any matter relating to construction, which, of course, is very much better understood by the artillery officers present; but I wish to mention a fact that has come under my personal observation when travelling abroad. In the north of Manitoba, where very strong wagons are required for that rough country, where, indeed, they often have to make the road on which they travel, breaking down the young forests and actually creating a trail for themselves, the wheels are so light that I am sure I am not exaggerating when I say that one wheel of an English farm wagon will weigh more than all the four wheels of a Canadian wagon. These wheels do their work well, and do not wear out before the wagons themselves. I think, therefore, that there is a field in this direction for the enterprise and ingenuity of artillery officers. Allowing that the tyre must remain the same width as at present, I think the wheel might be a great deal lighter. Another question is the best "brake." The band-brake on the hub of a wheel is an extremely powerful brake when properly applied, and is capable of being used with such effect that it will absolutely stop the rotation of the wheel. A band-brake on the hub of the artillery gun wheel would, I think, absolutely prevent the wheels turning when the gun recoils; at the same time, just lifting the lever allows the gun to be run up again the short distance that might still be necessary. The time spent in running up a gun is absolutely lost; it does no good, it is sheer waste of time. Further, when you have to prepare for great recoil, the gunners have to stand clear, and so lose the protection which they would otherwise get (from bullets) by the gun itself, and, if shields are adopted, they would lose the protection to be gained from them; so I think there is a field for invention and improvement in the direction of checking recoil and of shields. I cannot understand that the shield *need* be as heavy as the lecturer estimates, because a shield 2 ft. wide and 6 ft. deep would be more than sufficient on each side of the gun, but supposing that it was only on one side it would still afford very great protection to a certain number of the men, and at the weights given by the lecturer, such a screen would not amount to anything like the total weight he has named. They could be made to fold up and down like a lid. I agree with Colonel Tyler, and think that this is a most important matter and one that ought to be taken up. When we are engaging with troops that have no artillery I think it is madness not to have some sort of screen to protect gunners. One great objection to screens, when fighting against artillery, is that a shot or shell may sweep the shield away and clear out the whole of the gun detachment; but when you are fighting against men who have only rifles it seems to me it is a thousand pities that our gallant gunners should not be protected. Shields need not always accompany guns, but they might, at any rate, form part of the equipment, and be issued when required. Smoke is another important thing. I have noticed that the rows of little fires in a weedy field completely obscure the hedge on the far side of that field. I am convinced that if a certain proportion of our shrapnel shells had some smoke-creating composition enclosed in them, the smoke thus created would be very useful for ranging purposes, and would be invaluable for shrouding the intrenched position of an enemy in such a way as to prevent him from seeing our advancing troops. I think that our field guns should have a shell of sufficient power to destroy average brick walls, and to damage field works sufficiently to enable infantry to storm them without a check. The lecturer suggests that our artillery should have fixed boxes. I have, at times, found it necessary when crossing streams and small rivers that had been suddenly swollen by rain, to have the boxes removed and carried over by hand or in small boats. Then, again, if a box is injured it can be readily replaced, whereas if a fixed box were to be destroyed by a shell it could not be so easily repaired. For these reasons I think it will be found advisable to keep to movable, and not to adopt fixed, boxes.

Captain W. H. JAMES, late R.E.: It seems to me that the discussion with regard to the gun narrows itself to this point. If we have two calibres in the field, how shall we divide them? I confess myself I am very much inclined to take the German view of the matter, namely, that it is best to have one calibre for horse and field artillery, and if you have a second calibre at all, to have it in the form of a howitzer. The enormous simplicity thus obtained in the ammunition supply is,

I think, the great argument for this arrangement. I may draw attention to this, that in Austria recently the whole of the field army has been armed with the same gun, and they talk eventually of arming the horse artillery with guns of the same calibre, and, in addition also, they are introducing howitzers. Howitzers, I believe, are absolutely a necessity of the future, and it seems to me we in England should be the last nation to reject the use of howitzers or guns of large calibre, considering what our history shows they have done for us. I may draw attention, for instance, to Bull's battery at Waterloo, armed exclusively with 24-pr. howitzers, which fired what they in those days called "spherical case," which, practically, drove back Jerome's attack on Hougomont. Then we had the historical 18-prs. of the Crimean War, and the heavy battery at the battle of Ahmed Kheyl; all instances where heavy calibre has been of the greatest utility. An additional reason is this: If we are ever to take part in a Continental war, which, perhaps, is somewhat improbable, we should have to fight under modern European conditions, that is to say, fight battles which would extend very likely over two days, and attack positions carefully prepared beforehand. Against positions of this kind, which are strengthened with all the modern appliances of field fortification, the ordinary field gun is practically useless, and therefore you must have some heavier gun that will have a destructive effect on them.[1] That seems to me to be found in the howitzer—or mortar if you like—a short gun at any rate which throws a fairly heavy shell. And I may draw attention to the fact that every single European Power is introducing these guns; Russia has got them, Germany has got them, France is introducing them, Austria has got them, Italy is experimenting with them, and Switzerland has had them for some time. They have adopted them for this simple reason, that they get out of them so much more destructive effect against material obstacles in the field. There is no doubt also that in the future we shall have high explosives, high explosives certainly with howitzer shells, and possibly also with the field-gun shell. It is early days for us to lay down as an admitted fact that we cannot combine a high explosive with an efficient form of shrapnel shell. It has not yet been sufficiently experimented on to allow us to say it cannot be done. I quite admit, if you have the shrapnel in its present form, that a high explosive, whether at the base, or centre, or head, would not give the effect that you get out of the powder shrapnel; but it does not at all follow that a shell cannot be constructed which shall contain a high explosive and yet have a shrapnel effect. I am sure we must all be extremely pleased with the lecturer having drawn attention once more to that "will-of-the-wisp," the high muzzle velocity. What we want in guns is a gun which gives a good remaining velocity between 1,500 and 3,000 yards, and with that, really muzzle velocity has very little to do. I think this chimera has been thoroughly well swept away by the French officer who criticised Wille's pamphlet, the well-known German officer who wrote a book some years ago on the unity of calibre for field guns, "Das Einheits-Geschütz," and has recently been writing on artillery, and advocating a gun which is a perfect

[1] Major May, in his remarks, seemed to infer that shrapnel fire would suffice, and that high-explosive shells were not necessary, because the former would keep the enemy down behind his defences. I would point out in the first place that shrapnel fire has very little searching effect against men behind earthworks, and that it is useless, moreover, merely to keep them down behind the latter. For when the near approach of the attacking troops renders it impossible for their artillery to continue its fire, the comparatively uninjured defending infantry can fire on the fully exposed hostile attacking force from behind cover, *i.e.*, from a position in which, as experiments have shown, they will be liable only to a fourth of the loss suffered in the open. High-explosive shells are a modern necessity to deal with the greatly increased construction of artificial and utilization of existing cover, and they have the additional advantage of great moral effect owing to the enormous intensity of their local action. I may point out also that the Germans propose to use them with time-fuzes set to burst just on the crest of the defender's position, because they say this is the only way to get at troops so posted.—W. H. J.

impossibility, for which he has been, as I say, well criticised by a *French officer* in the "Revue d'Artillerie"; a translation of the major portion of it has appeared in the proceedings of the Artillery Institution. What we really want is a velocity at a fitting range, and that is attained not so much by muzzle velocity as by a proper *proportion between W and D²*. There is also a point that has not been alluded to by the lecturer, in which there is a field for technical progress, that is, as to the composition of the time-fuze. Many years ago I said, and it was pretty well approved of at the time, that what we wanted to seek for was a chemical compound, and not the mechanical mixture which we now use for the time-fuze composition, and probably in these days of cordite and the use of nitro-explosives, we can get some substance which may be used for a fuze which will burn much more regularly than any mechanical mixture ever can. With regard to the quick-firing gun, I must say *that I think it is a very problematical question whether field artillery* will ever have a quick-firer in the real sense of the term. We may have improvements in the breech mechanism which may render loading slightly quicker, but I am a little inclined to doubt whether we shall ever come over to the regular quick-firer. As to shields, I should like to point out, with reference to a remark made in the *discussion, that it would not be possible to have shields that are hardened to such* an extent as very much to do away with the thickness, namely, about ¾ in., which is required to resist rifle bullets at fairly close ranges, and for this reason, that if you Harveyize the steel made for *shields you make it very brittle. Occasionally in* France the steel armour plates which are sent down from Creusot to be used for the sides of their line-of-battle-ships split spontaneously as it were, that is to say, the surface by being very much hardened is in such a state of high tension that it is like the indestructible glass that a great deal was made of some years ago; it *may last for some time, but it suddenly may go into powder.* If you go in for the shield at all, it must not be a very hard one, but a tough material, because otherwise if struck by a number of bullets it would go all into pieces, and you would have a gratuitous addition to the shrapnel that the enemy was firing at you. I think, with regard to quick-firing ammunition, that it is perfectly possible that the cartridge case of the future, if we do have it, will be made of iron. Within recent years, or months almost, a number of experiments have been made with iron which seem to show that it will be possible to manufacture it with certain alloys which render it very tough and not liable to rust, and which will, therefore, be better adapted for rough usage in the field, because stiffer than the brass cartridge case; but whether we could use quick-firing guns in the future or not is a very moot problem.

Colonel FRASER, R.E.: I should like to ask the lecturer whether he can tell us what are the elements that go to make up recoil—what is recoil due to?

Colonel D. O'CALLAGHAN, R.A.: There was a general remark made by Colonel Tyler as to the history of the field or horse artillery 12-pr. It was originally the 12½- or 13-pr. Armstrong gun, and, oddly enough, one of the things which caused it to be looked upon as a good gun was the extraordinary effect of its shrapnel. I well remember that there were two diagrams brought to Shoeburyness by Captain A. Noble at the time, which showed the superiority of the shrapnel with the bursting charge in the head.

Major E. S. MAY, R.A.: With regard to what has been said about the value of howitzers and high explosives in the attack of troops occupying intrenchments, I think it should not be overlooked that when shrapnel has prevented men from manning a parapet, it has effected its object to a very great extent. The troops which have cover behind earthworks, or have hidden themselves under head cover, have been most effectually for the time made prisoners. They have in fact been put out of action. And not only that, but have been put out of action at the very moment when it might have been expected that their fire would have been most deadly. The experiences of the Russo-Turkish War have shown that, during the assault of intrenched positions, it was when the attack was some distance away from the parapet that the fire of its defenders was most effective. As the assailants came close up, the defenders very frequently ost their heads and fired in the air, but while they were still distant shots were deliberately aimed. With reference to quick-firing and ordinary field guns, I think Captain Headlam's com-

parison, interesting as it was, would have been more convincing, had it been a little more searching. The effect produced is the vital point. Are a greater number of light shells likely to effect more destruction than a fewer number of heavier shells? Six 10-lb. shells weigh 60 lbs., and five 12-lb. shells are of the same weight. Now which 60 lbs. of ammunition carried will most benefit us? I imagine that the five shells from a 12-pr. will be the most destructive both against personnel and matériel. And I think that the objection to the quick-firing gun lies chiefly, therefore, in its lack of power. But with reference to this point, I would enquire if there are any data that would tell us—firstly—how many aimed rounds of shrapnel can be fired from each gun in a minute?—the fuze not being set beforehand, and the targets such as you would meet with on active service, that is to say, not very clearly defined: and secondly—what number of hits may be looked for from each under these conditions? Colonel Tyler has forestalled me with regard to rapidity of fire, and I think he has touched very aptly on almost everything that can be said on the subject. Nevertheless, I cannot help making use of the present occasion to urge that rapidity of fire, after the ranging process has been completed, ought to be cultivated as of great importance. I do not think we can hope for, or that we wish for, a quick-firing gun such as Colonel Langlois has advocated, to whose excellent work on field artillery the lecturer has already referred. Colonel Langlois speaks of a quick-firing gun firing 10 rounds a minute and protected with steel shields. That is his ideal field gun. Possibly it may be what we shall have to come to, but I for one do not agree with that view. Still, I think we ought to aim at rapidity of fire, because at a decisive moment it will be required, and on certain occasions rapidity of fire might go far to neutralize disproportion as regards strength in guns. I will give you an instance of the kind of situation that is in my mind. Imagine a combat in which a force with two batteries was engaged against one with three. Suppose one battery to be told off to find the range, then, since it is an admitted fact that usually guns only reveal their presence when they begin to shoot, the second battery might "lie low" and remain unobserved, until the range of the enemy's guns had been obtained. If it then opened a very sudden and rapid fire on the hostile guns, it might take them completely by surprise, they would be some time discovering from whence the new fire proceeded, and it is possible, therefore, that this hitherto unthought of battery might fire enough rounds, ere an effective reply were made to it, to destroy one of the opposing batteries, and then the two artilleries would be on an equality, and the combat would go on as between two equal forces. I think everyone admits nowadays, moreover, that the effect of artillery fire is greatly enhanced by its being sudden. But the suddenness will be of little value unless it is combined with great rapidity of fire, and rapidity has a moral value too, for it is not the number of men who are crippled, but the time in which they fall, which makes the effect. Therefore, I venture to think that, although we cannot go to quick-firing guns, at any rate we should strive for and cultivate rapidity of firing as far as possible, always remembering that we should never sacrifice accuracy to obtain an acceleration. I fancy, however, that advances, with loss in other directions, might be made in respect of rapidity, and although we should be very chary of putting forth our full power, still it would be well that we should be capable of pouring in at supreme moments an overwhelming fire. It would never do, however, to waste ammunition, and it would only be after the range had been established, or the necessity for doing so been obviated, that such measures could be resorted to; and accuracy should undoubtedly always be the first consideration.

The CHAIRMAN (General Chapman): I think it important to draw attention to the opinions given by the Committee of officers of the Royal Artillery, appointed last summer to consider the question of the 12-pr. gun. These conclusions set at rest some of the questions which Captain Headlam has to-day brought before us, and I cannot but think that they are in accordance with the opinions which most of the regiment entertain. They may be summed up as follows:—(1) That there should be but one equipment for the horse artillery. (2) That the weight behind the team should be—for the field artillery as at present—for the horse artillery 30 cwt. (3) That the same calibre be maintained for horse and field artillery guns. (4) That a muzzle velocity of 1,550 ft.-sec. now under trial will probably be found

suitable for horse and field artillery. (5) That the number of rounds per gun should be 150. This last question determines that of adding to the number of wagons with batteries. When so important a matter as that at present under consideration is brought forward, we must not overlook the fact that a change in our field artillery equipment must involve a great expenditure to the country. We of the regiment are satisfied as to the necessity for that expenditure, and much has been done during the last few years to make the army at large take an interest in our proceedings. It is, believe me, an army question, and a question for the country, which has to be decided. If the army realizes that upon the efficiency of the artillery its success must in a great measure depend, it will be ready to support our claim to a new armament. Major May in his recent papers has contributed to a belief in the value of field artillery in past wars, and has, I consider, done us very good service with the army at large. I purposely refrain from entering into a discussion of the various points which the lecturer and those who have followed have so ably brought out, but I feel that on the present occasion I hold a brief for General Nairne and the officers of the artillery in India, who hold opinions that differ to some extent from our own. Referring again to the expressed opinion of the Committee assembled last year, viz., that our field artillery gun should be required to fire a 15-lb. shell, I must read extracts from General Nairne's last letters to me on the subject: "Nor does it seem to me sound to follow other nations, unless convinced that they are right. I refer to the constantly alleged necessity, in which you join, for a heavier shell. I am firmly convinced as I always was, that the two first desiderata are mobility for horse artillery, and power for field, and that no field shell that can be carried is any use against earthworks, and therefore we must use our shrapnel according to its power of killing, or stopping men and horses. To do this, a remaining velocity of anything over 400 ft.-sec. is sufficient, but we have got a great margin with the 12-lb. shell, even at 4,000 yards. Yet everyone clamours for 15- or 20-lb. shells, because their remaining energy is greater than the lighter shells. The advocates of heavy shells quite omit the advantages of flat trajectory at short ranges. Amid all the noise and bustle of a general action during the later phases, who is going to 'range' his battery? 'Aim low' will be all we can do, and the flat trajectory is an enormous advantage. It means hitting every time, when your heavy shell, with necessarily lower velocity, will fly overhead. In the early days of the 12-pr. I saw shooting, better than the so-called Swiss, as to which Walford does not give us quite enough detail to enable a fair comparison to be drawn. Quite recent shooting of the 12-pr. showed first six or seven shells inoperative beyond target, and the next eight gave an average of 129 hits per shell. Why decry the 12-pr. so persistently, when the above is proof positive, that the man and not the weapon is at fault? Acland, with a 6-pr. quick-firing rising shrapnel at Vienna made more hits in a short time at 2,000 yards than the total number of bullets contained in all the 12-pr. shells that could have been fired in the time. If this be possible, where is the necessity for heavy shells? Mobility and flat trajectory are the first desiderata, and the heavy shell sacrifices both. I gave an instance of Acland's performance with a 6-pr. quick-firing as being better than could possibly have been done in the same time by the 12-pr. But I did not mean to imply that I advocate a 6-pr. I do not, because I believe the 12-pr. can be got down in weight without reducing the velocity at all, into a practical weight for horse artillery. We have pulled off the traversing gear and the brake, and are using drag shoes with success, and I believe, with nine waggons, that the 12-pr. would do." What I feel is, that although we may have some divergence of opinion with regard to details, we are in agreement as regards the main facts, that we require a new gun for the horse artillery, and that we need to add to the proportion of our field artillery to infantry in our present army organization. I have only to draw attention to an Appendix to the Report already referred to. What I think we should aim at is, that we who are all earnestly bent on getting this matter fully considered, should not let differences of opinion lead us into unnecessary controversy. Before going further, I must notice that Captain Headlam has not sufficiently considered, in my opinion, the effect of the introduction of cordite upon this question. I think the quotation he has made regarding the new German field artillery may be somewhat

misleading. Whatever foreign nations may do in improving their matériel, they must adhere to the principles which govern the construction of artillery everywhere. The value of a high-explosive shell, as compared with a shrapnel such as Captain Headlam outlines, can only be determined by careful experiment. What I hope may be the result of this lecture, and of all the work which is being done at Shoeburyness, Woolwich, Okehampton, Aldershot, in India, and at all places where the field artillery is stationed, is to determine the differences of opinion which now exist with regard to detail, so that we may be able to convince the army and the country that the Royal Artillery are of one mind on the subject of re-armament. We have put before the authorities what we consider to be the best way of coming to a conclusion upon the subject, and I can only hope that in course of time, the matter may receive the attention it deserves. What I desire to impress upon all who are interested in it is, that we need to work together, both in the department of the Director of Artillery, which must be responsible for our matériel, and in the regiment at large, which has the greater experience in the field to guide it. We are all Royal Artillerymen, we have all the same object at heart, viz., the good of the Service, and if we persevere in our endeavours we shall succeed.

Captain HEADLAM (in reply): I do not think there is very much for me to say, but there are one or two points noticed by various speakers. Colonel Richardson, in talking about the high-explosive shell, said himself what I had gathered from the little I had been able to find out about it: that you wanted a heavier shell than the ordinary field shell. I think Colonel Richardson said that he got a very violent effect, but with rather a heavier shell than can be fired from an ordinary field gun, if it is anything like what we have at present. As to the question of hardened steel that Colonel Tyler mentioned, I did not like to embark on this subject, because it is too difficult. I felt I was not at all competent to speak on it. It is a question of metallurgy. But Captain James mentioned a very great disadvantage of these hardening processes. General Wilkinson mentioned that the weight of the shield did not come to anything like what I put it at. I calculated that it would want about 24 sq. ft. for the shield, and that comes to over 3 cwt.; but if you have to raise and lower it, as Colonel Tyler laid down, you must have a certain amount of mechanism which will all mount up very much in weight. I do not think you will be able to get a shield under 3 cwt., and it is a question whether you care to sacrifice that weight; whether you will have the weight in the ammunition or the shell. It is a point upon which I do not hold any decided opinion, as it is rather a question for discussion and trial. Captain James spoke about having one gun for horse and field artillery. He said a good many foreign nations were trying it, and that it resulted in great simplicity of ammunition supply, and so on. What I said on this subject was that *we had tried it*. I think most artillery officers would agree with me that in having one gun for both field and horse artillery, you must either lose mobility in the horse artillery, or power in the field artillery. I do not speak at all against howitzer batteries, which I should think would be excessively useful; but I do not think we ought to take away any of our present small stock of field batteries and put howitzer batteries in their place. I consider them a most valuable adjunct, but I do not think they ought to replace the field batteries, and I believe that is the course being taken in most foreign countries so far as I know.

Colonel TYLER: And by ourselves.

Captain HEADLAM: Ourselves out in India. Captain James mentioned the case of a heavy battery at the attack on Ali Musjid. As to the elements which go to make up the recoil, I take it three main elements are, first, muzzle velocity; second, weight of shell; and thirdly, the weight of the gun and carriage. If you increase the velocity or weight of shell, you increase the recoil. If you increase the weight of carriage with the same velocity of shell, you reduce the recoil, but the velocity makes the most difference. If you increase the velocity, you get a much more violent recoil, and the question is what arrangement we ought to make with our 12-pr. guns to check it. Major May mentioned a trial of the effect of the 12-pr. as compared with a quick-firing gun. That of course is very difficult to get at by result. He mentioned that the firing of the 6-pr. quick-firers at Vienna gave a very much better result than was given by the 12-pr. I saw the 6-pr. tried

at Okehampton, the same gun against the 12-pr., and in that case the effects were the reverse. The effect of the 6-pr. was not in any way to be compared with that of the 12-pr.; so that unless you have very carefully conducted experiments, each round being taken and the number of hits, you cannot speak confidently as to the effect.

Major MAY: The great number of rounds, or the effect in the given time?

Captain HEADLAM: At Okehampton there was the effect in the given time. That of the 6-pr. did not compare with that of the 12-pr. I am speaking from memory. I do not think anybody who saw it was at all pleased with the effect of the quick-firer.

Major MAY: I have seen some in Germany, I think 8·8 and 17·15 quick-firing guns.

Captain HEADLAM: I took a 10-pr. quick-firer in comparing the ammunition, as being about the size that Mr. Nordenfelt proposed. I do not think there have been any very reliable experiments between the two under exactly the same conditions. For instance, in the trial at Okehampton, where the quick-firer came off very badly, it had a very inaccurate fuze; the fuze did not work at all well. I do not think you can arrive at conclusions in that way. As to the rapidity of firing that Major May also mentioned, I am certainly greatly in favour of firing as rapidly as possible as long as you keep up the observation regularly. It is no good firing rapidly if you do not *hit*, and I believe you will never get hits with irregular firing, every man firing independently. You must keep regularity. Any increase of simplicity in the service of the gun so as to reduce to a minimum the actual delay in the processes of loading, running up, and so on, is of course a very great advantage, and we cannot speak too much in favour of gaining everthing in that way. But it is no use doing it if it is at the sacrifice of too much in the way of either weight of shell or the number of shells carried. All these things are a compromise. It is a question of sacrificing one thing for another. As I do not think firing can be more rapid than you can observe, I do not think it worth while giving up great carrying capacity or mobility to get a gun that will fire ten rounds a minute, because I do not think you can observe that amount of firing, or ever keep it regular.[1]

The CHAIRMAN: It merely remains for me to offer your thanks to Captain Headlam for his lecture, which has been most valuable and instructive to us all, and I hope will be of great use in furthering the object that we all have in view.

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[1] I had intended to say (in answer to General Wilkinson) that the nave brake had been tried by us both in the form of a friction band, as in the Mark I, 12-pr. carriage, and with an actual dead lock. It is, undoubtedly, light and compact, but it has not proved generally successful. In addition to other disadvantages, it brings a very heavy cross-breaking strain on the spokes.—J. H.

Friday, April 14, 189?.

COLONEL W. J. GASCOIGNE, Commanding Scots Guards, in the Chair.

THE MOBILIZATION OF THE VOLUNTEERS.

By Captain H. D. SICHEL, 3rd V.B. West Riding Regiment; Supply and Transport Officer, West Yorkshire Volunteer Infantry Brigade.

Definition.

IT may appear to be almost a waste of time to define what mobilization is, but in face of the continual statements in the daily press that certain Volunteer battalions have been mobilized for the Easter Manœuvres, it may not be amiss to point out the distinction between spurious and true mobilization.

The troops that annually take part in the Easter operations near London are an example of a spurious mobilization. The men are there, the rifles are there, and, in some instances, two or three transport wagons may be there. But there is no ammunition, no system of feeding the men beyond that of purely civil catering, which would be impossible in war; there are no "iron rations," no transport train, no organized supply or ambulance detachments, in short, there are none of those auxiliary organizations in operation which are absolutely essential if any body of troops wishes not only to *take* but to *keep* the field.

True mobilization, as the name implies, is the transition of any disciplined body of troops from a peace footing to a state of readiness for war. No army, under modern conditions of civilization, can hope to maintain itself during peace at war pitch. The drain on the manhood of the nation, and on its intellectual and commercial progress, would be far too heavy to be borne for any length of time. In all armies, therefore, there are considerations which render it imperative that only a certain percentage of its eventual strength should be present with the colours, ready on the first alarm to act as a nucleus round which the reserve men, the stores, and auxiliary services can concentrate. It is only when this peace nucleus, by the addition of these men and stores, is in a position to "go anywhere and do anything," that the force can be considered fully mobilized for war.

I purpose to-day to consider the simplest and most effective method of changing a Volunteer brigade, the highest unit we possess at present, from its normal peace footing to such a state of war-readiness that, at *twenty-four hours' notice*, it may be able to turn out complete in men, arms, ammunition, stores, and train, ready to take its place

either in a mobile field army, or as part of a garrison force for the defence of some position of importance.

In one sense the Volunteer force is in a unique position as compared with the rest of our army. It can only be called out for active service in case of actual or apprehended invasion of the United Kingdom, and any attempt to formulate a scheme of Volunteer mobilization must necessarily be guided by the nature of the possible attack and the strength and efficiency of the forces which may be arrayed against us.

Possibilities of Invasion.

It would be manifestly out of place to endeavour to discuss in *detail* the probabilities of a hostile invasion of this country, but it may not be amiss to consider briefly the circumstances which may render such a calamity possible.

These circumstances seem to divide themselves naturally into two classes:—

1st. We may have ample warning of our enemy's intentions.

2nd. We may be attacked by means of a sudden and unexpected rush—in other words—surprised.

Invasion over Disputed Sea.

The first case is not nearly so dangerous as the latter; it would mean that we had timely notice of the threatened landing, by the enemy's attack on, and destruction of our fleets. Naval history furnishes many instances in support of the position that, if war is undertaken with the double object of gaining the command of the sea in the first instance, and afterwards of utilizing this newly-acquired water territory as the pathway across which an invading army can be passed, a considerable period would most probably intervene between the commencement of hostilities and the time when one combatant would gain such undisputed control of the seas that he could throw his land troops across into the enemy's country without fear of interruption.

Napoleon's attempted descent on England, in 1804, may be cited as a case in point. His troops and transports lay ready for instant use, yet he was unable to throw them across the narrow strip of water which lay between him and his objective, until his fleets had secured him undisputed control of the intervening waterway by the destruction of the British squadrons. For over a year the "Grand Army of England" was doomed to a forced inactivity almost within sight of the promised land, and it was not until October 21, 1805, that Trafalgar gave the project its *coup de grâce*.[1] Similar conditions may not always obtain, but we may, at any rate, assume that, if the com-

[1] Napoleon really abandoned his intentions against England in August, 1804. Hearing then for the first time that Villeneuve had gone to Cadiz instead of to Brest, he burst into a torrent of invective against that unfortunate officer, and calling to his secretary, exclaimed, "Daru! mettez-vous là et écrivez," and dictated forthwith the orders which set his troops in motion towards the Rhine, and which resulted in the victory of Austerlitz. *Vide* Dumas, "Précis des Événemens Militaires," vol. xii, p. 119.

mand of the seas is disputed, the first operations of war must be naval, and that a certain time must be occupied in gaining such control of the seas as will enable its possessor to feel sure of a safe and uninterrupted water communication between his base and his objective.

Our fleet is our first line of defence, and before that line can be broken down a period of some weeks, or even of some months, would probably elapse. This delay would tend very greatly to the advantage of the defence, as it would allow of the deliberate collection and concentration of its land forces. But we must not shut our eyes to the fact that, although it may take time to accomplish, the defeat of our navy is still within the bounds of possibility.

We must not, in spite of the protests of many naval writers, deliberately ignore the possibility of some great naval disaster. We must remember that, although naval strategy is a well proven science, naval tactics are, like the algebraical "*x*," an unknown quantity. No one can foretell the result of a sea fight under modern conditions and with modern fleets. No one knows the exact tactical value of large ships with heavy guns, as compared with that of small, handy ships with a lighter armament. No one can venture to predict what havoc the torpedo may do if used in grim earnest, and no one can say how the chapter of accidents[1] may affect a squadron. This train of reasoning, I am aware, is a weapon which may cut both ways, but until we can be certain that this weapon will not fall with the edge turned towards us, we are safer and wiser in contemplating and preparing for the possibility of defeat.[2]

We must, moreover, not forget that, in spite of our superiority in ships over our great maritime rival, mere numerical superiority does not always imply supremacy. Although our fleets are to those of France as 3 is to 2, our Colonies, our coaling stations, and our seaborne commerce imperatively demand the protection of no inconsiderable number of ships, and, without wishing to raise any question of national policy, it seems reasonable to assume that if the presence of these vessels in remote seas is necessary in time of peace, it will become doubly necessary in time of war. I believe, therefore, that I am justified in arguing that our margin of superiority must be calculated, not on the total strength of our fleets, but on the strength of the squadrons available for action at the critical moment and at the vital point.

Under these circumstances I think few will be disposed to deny the possibility of a naval disaster, although such disaster, if it came, would probably give us time to call out and mobilize our land forces with a certain degree of leisure.

Surprise Invasion.

But there is another form of invasion which is not generally apprehended, and which both on that account and from its sudden-

[1] *E.g.*, the grounding of Her Majesty's ships "Victoria" and "Howe."

[2] It may be interesting to recall the fact that we have several times lost the command of the British Channel, *e.g.*, in 1690, in 1744, and in 1779. In these years we escaped invasion by luck rather than by good management.

ness is all the more deadly. I refer to the possibility of the sudden descent, under certain conditions, of three or four fully mobilized hostile army corps on our shores without any attempt to gain more than a partial and temporary control of the intervening seas. I am well aware that this operation is, at first sight, totally at variance with the canons of all naval writers. An attack on territory without having previously gained command of the seas has apparently always been foredoomed to failure. Hoche's attempt on Ireland in 1796 and Napoleon's invasion of Egypt in 1798 are, perhaps, two of the best known instances of abortive invasion. But there is one very important distinction between such operations as these and an invasion of England itself. In both the cases instanced above the objective of the French was a purely secondary one; it was not that the seizure of Ireland or Egypt would attain the ultimate object of the campaign; it was the facilities which the possession of these countries would give for ulterior operations against England and India that prompted France to attempt their reduction. The objective of attack in each case was but a preliminary, a base on which to build up a stronger and more effective assault on the real object of the campaign, the power of Great Britain. Both attempts succeeded to a certain point; in both cases[1] troops were landed, and, in one instance at least, some brilliant successes were gained. But the landings were useless and the military successes thrown away, for, after a British fleet had once cut the communication between France and the expeditionary forces, it was merely a question of time, and time brought only the one inevitable result, the unconditional surrender of the invaders. Powerless to strike a vital blow, themselves cut off from their base of supply, and confronted by an enemy who had comparatively unlimited reserve power behind him, no other course was open to the French troops. Such an operation under such conditions is justly condemned by naval critics as a secondary blow, which can only be temporary in its effects. But compare these landings with the effect which the throwing ashore of three or four French army corps would have on the south coast of England. Once landed, it would matter little whether retreat were cut off or not. Whether we could oppose a sufficiently numerous and efficient army between the invaders and London in time to save the capital is an open question; but there can be no question that the indirect effects alone of such an invasion would be so serious that it would take us a generation to recover from the blow. It would be a straight and rapid thrust at a vital part of the Empire; if successful, it would mean ruin to England; if it failed, it would only entail on France the loss of three or four army corps, a loss no greater than she would suffer in one short land campaign.[2] France is the only country from whom such

[1] The military results of the French invasion of Egypt are too well known to need recapitulation here. In 1796 Hoche passed the blockading British squadron in a fog, which concealed his ships, but caused them to separate. "On the shores of Ireland at this time there was an invading General without troops, and a force of invading troops without a General." Hozier, "Invasions of England," vol. ii, p. 283.

[2] Numbers killed and wounded:—Gravelotte: Germans, 20,000; French, 15,000.

an attack is to be feared, and it is always possible that she may be ruled by some ambitious soldier who may be tempted to try this sudden dash on *le perfide Albion* and dictate in defenceless London that celebrated treaty of which the first article will be, "*L'Angleterre n'a pas et n'aura plus de flotte.*" The cost of such an attempt to France in case of failure I have already pointed out; the possibility of such an attempt I believe can be demonstrated. In 1798 Napoleon embarked the army of Egypt at Toulon, and, though watched by a squadron under Nelson, landed his troops without a single British gun being fired. Hoche, too, in 1796, although nominally blockaded in Brest, was able, though with diminished forces, to reach Ireland. But Egypt was not Kent, nor Bantry Bay, Sussex. Had the blow fallen nearer home the result of the landing would have been very different, and the interruption of sea communication would have been a matter of secondary importance compared with the defence of the capital. In both these cases the invaders were enabled to disembark troops, although they had been either observed or blockaded by hostile squadrons. How would such an operation succeed, we naturally ask, if there is no eneny at sea within striking distance? The answer is obvious; and it is not difficult to imagine a political situation which may draw off the attention of our fleets, leaving the Channel practically undefended. Without assuming any hypothetical case, we need go back no further than 1882.[1] In that year complications arose in Egypt, and the combined British and French fleets appeared before Alexandria. But there all co-operation ceased. The British bombarded the forts and occupied the town. The French fleet weighed and steamed away westward, no one knew whither. There happened to be at the same time four army corps fully mobilized in the north of France, whilst the British Channel Squadron consisted of but four ships. Everyone must remember that our diplomatic relations with France were what is euphoniously termed "strained." In a case like this what is there, I ask you, to prevent the French Alexandrian squadron from passing Gibraltar by night, from joining hands with her fleets in Brest and Cherbourg, and from covering the passage of her four mobilized army corps across the Channel? France had all the elements of local naval supremacy on her side, she had a network of railways leading to her northern ports, ample wharf accommodation, a sufficiency of tonnage, French and British, available in those ports, and plenty of time to carry out a descent on England without fear of opposition. Probably it was the unexpectedly sudden development of the Egyptian crisis, or the fear of Germany, that proved our salvation in 1882. Had France's real object been England, nothing we could have done would have prevented her landing troops, and troops once landed, our then chances of success would have been very doubtful.

Mars-la-Tour: Germans, 14,000; French, 16,000. Wörth: Germans, 10,000; French, 7,000. Königgrätz: Prussians and Austrians, 28,000. Metz: 180,000 French surrendered. Sedan: 60,000 French surrendered.

[1] Also in 1878, when the British Fleet in the Mediterranean was for months in Besika Bay.

I am not aware that the possibility of a sudden descent has ever been discussed, nor do I desire to raise a discussion on it to-day. All that I claim is that, as ten years ago the general situation was such as to allow of its feasibility, it is not unreasonable to argue that it is within the bounds of possibility that a similar situation may obtain at some future period. This form of invasion is, undoubtedly, the most dangerous and most fatal we can be called upon to deal with, but, its possibility once established, it behoves us as prudent men to consider how it can be successfully met. In formulating any plan of defence it would be manifestly unsound if we only took into account circumstances the most propitious to ourselves. Our true policy is to prepare for the *very worst*, and it is for this reason that I desire to-day to consider a situation as little favourable to ourselves as possible. If we can devise means of successfully coping with an attempted invasion under such conditions, we can afford *a fortiori* to contemplate with confidence an attack under any other circumstances. Let us assume a state of affairs similar to that obtaining in 1882.

The Question of Time.

The first question is one of *time*. How long will it take France to disembark a sufficient force on our south coast; how long will it take her troops to reach London; how long will it take us to push forward a sufficiently strong force to check the invader at a safe distance from the capital; and, as a natural corollary, how long will it take us to mobilize our troops? To arrive at a reliable conclusion on these points, we must necessarily cross the Channel and place ourselves for the moment in the position of the assailant.

Let us suppose that the British fleets are occupied elsewhere, and that only a weak squadron is in the Channel ports. Three or four[1] of our Northern army corps are fully mobilized, and have had some weeks' training, so that the reservists are accustomed to their work, and the whole force is in excellent condition for war. To Dunkirk, Calais, Boulogne, Dieppe, Fécamp, Havre, Honfleur, and Cherbourg run excellent lines of railway with ample rolling stock, all Government property, and all at the beck and call of the War Minister. There is plenty of wharf accommodation[2] for the troops, and a sufficiency of

[1] Those at Rouen, 3rd Corps; Orléans, 5th Corps; Rennes, 10th Corps; Nantes, 11th Corps; Le Mans, 4th Corps.

[2] Colonel Rothwell, "United Service Magazine," vol. 14, p. 136, October, 1891. There is accommodation for vessels lying alongside the wharves in "line ahead" as follows:—

Dunkirk	20	vessels of	3,000 tons.
Calais	16	,,	,, ,,
Boulogne	6	,,	,, ,,
Honfleur	10	,,	,, ,,
Cherbourg	24	,,	,, ,,
Dieppe	10	,,	2,000 ,,
Fécamp	2	,,	,, ,,
Havre	5	,,	4,500 ,,
,,	18	,,	3,000 ,,

Total, 328,500 tons gross.

steam[1] tonnage in the various ports. Many of these vessels are English; but it is England we are going to invade, and, on the first move, these vessels may be seized as our lawful prey. This is a master stroke of policy, and the Parisian press waxes keenly satirical over "*le lion Britannique*" being worried by its own cubs. On the day that this seizure of vessels takes place, telegraphic communication is placed under the strictest censorship, and after twenty-four hours ceases altogether. At the same time the mail service between the two countries is interrupted. An army of carpenters and engineers, previously arranged for, is put to work to alter the fittings of such of the vessels[2] as are destined to convey horses, and these fittings, prepared beforehand,[3] are in position within the twenty-four hours. All this takes place on the Sunday, our Government having resolved to avail itself of the insular Sabbatarianism of our British neighbours by effecting a great proportion of its preparations on a day which to them is a *dies non*. On this same eventful Sunday[4] the four mobilized army corps are moved by rail to the ports selected for embarkation, and by midday on Monday the force is ready to sail. It is a short steam of from three to twelve hours to the English coast, and Tuesday morning sees the British Channel fleet blockaded[5] in its fortified harbours and three hostile army corps prepared to disembark without fear of interruption. A calm sea[6] favours this operation, and, by landing in divisions at points within easy supporting

[1] 1 ton per man, 3 tons per horse, 6 tons per gun or wagon.

100,000 men.....	100,000 tons.	
9,000 horses.....	27,000 ,,	
1,500 guns and wagons.	9,000 ,,	
	136,000 ,,	net = 230,000 tons gross.

France has 500,000 tons of mercantile steam shipping, of which half belongs to the Channel and Atlantic ports, and 80,000 tons of military transport, of which 70,000 tons could be made available for an invasion.

Gross steam tonnage available for sudden invasion—

Military transports.....	70,000 tons.
Mercantile steam transport, reckoning 40 per cent. of total tonnage.....	100,000 ,,
British ships seized and foreign vessels purchased	60,000 ,,
	230,000 ,,

Vide "Liste des Bâtiments de la Marine Française."

[2] The military transports would be utilized for the conveyance of horses, guns, and wagons.

[3] Many vessels (military transports) have been prepared at Brest for a bogus expedition to the West Coast of Africa. These put to sea on the Friday, reach the Channel ports on Saturday night, and embark the guns and horses.

[4] Movement by rail commences on Saturday.

[5] By the Brest and Cherbourg squadron, with which the Mediterranean fleet has joined hands.

[6] *In the summer*, calms in the Channel usually last forty-eight hours. But a calm is by no means essential. Napoleon and Abercromby both landed in Egypt in anything but favourable weather.

distance of one another, the evening of Tuesday[1] sees the whole force[2] safely ashore. From this shore base, between Dungeness and Selsea Bill, the distance to London does not exceed 60 miles, and the marching powers of the troops have been well attended to during the preceding manœuvres, many regiments having covered as much as 30 English[3] miles a day. Allowing for the time occupied in concentration, and the inevitable delays in moving large bodies of troops, London can be reached in three days;[4] so that if no opposition is met with, we may expect to enter the capital on Saturday.

Let us turn now to our own side and see how this sudden invasion could be met.

Owing to the strict supervision of the French censors, no news of any moment reaches England on the Sunday, though uneasy rumours are prevalent in official circles that all is not as it should be. But late on Sunday night, or rather in the small hours of Monday morning, a telegraphic message, *viâ* Brussels, gives the Government warning of the intended French descent. A naval defence is out of the question, as the ships are too far away to be recalled in time. It is to our land army that we must trust, and it is a question whether it is possible to mobilize a sufficient force in time to bar the invader's advance. The 1st Army Corps at Aldershot should be ready at twenty-four hours' notice, but it is hopeless to try to prevent the disembarkation of three army corps along a long line of coast by the action of a land force only one-third of their strength. The power of steam, the uncertainty of the exact place of disembarkation, and the tremendous weight of modern naval artillery combine to render the defence of the country on the coast itself a most uncertain and hazardous proceeding. If opposition is to be offered, it must be by a sufficiently large force posted in a position some 15 to 20 miles from the capital, so that a possible reverse may not necessarily mean total defeat, and that there may be time and space at our disposal to try the "wager of battel" a second time. We have seen that one army corps ought to be ready at twenty-four hours' notice; but, according to the recently published mobilization tables,[5] the 2nd and 3rd Corps are composed largely of the troops stationed in Ireland and of Militia, and these could not be mobilized under four to five[6] days—too late, as I shall show, for any decisive action.

If the great battle is to be fought 15 to 20 miles distant from

[1] September 14, 1854, we landed in the Crimea, without aid of steam launches, 14,200 men and 12 guns in six hours. Kinglake's "Crimea," and Admiral Sir William Mends, in the "Journal of the Royal United Service Institution," vol. vi, p. 397.

[2] Except the second line of trains. The force would have time to advance 5—10 miles inland the same day.

[3] "Times" correspondent, French manœuvres, 1891.

[4] Napoleon, in 1804, was confident of reaching London three days after landing, in spite of any opposition which could be offered by our regular troops, Militia, and half a million Volunteers. Dumas, "Précis des Événemens Militaires," vol. xii, p. 21.

[5] "Royal United Service Institution Journal," vol. xxxvi, November, 1892.

[6] Probably ten days.

London, we ought to allow twenty-four hours for troops assembled in the capital to reach the position and take up their allotted stations. This means that we must be able to collect in the metropolis at least[1] four army corps, in addition to the Aldershot one, twenty-four hours before the decisive action is to be fought. As this is to take place a day's march from London, it follows that we must be in position on the Thursday night *at latest*, *i.e.*, four days after the first alarm, and, consequently, four days[2] after the receipt of the telegram "*Mobilize.*" Allowing that of the four corps required for the defence, in addition to the 1st (Aldershot) Corps, one is a provisional corps of those regular troops stationed in the English provinces, we are compelled to fall back on the Volunteers for our three remaining corps, and the problem before us thus resolves itself into this: "Can we place 100,000 mobilized Volunteers in position a day's march south of London at four days' notice?" Before giving our answer, let us see how these four days must be utilized. We require one day to move our troops from London to the selected position; at least one day to bring up the provincial corps by rail to the metropolis; we may calculate that before the order to mobilize is received at each brigade headquarters[3] half a day is lost, so that, practically, our Volunteer mobilization has to be effected in twenty-four working hours from receipt of the order. In other words, the War Office sends out telegrams to the various Brigadiers on the Monday morning, the brigade office issues the order to mobilize by noon the same day, and the troops must be in London by Wednesday evening. This leaves us an interval of a clear day in which to mobilize each Volunteer brigade, and by Tuesday evening every Brigadier should be in position to telegraph to his Divisional Commander, "My brigade is fully mobilized, and is ready to be moved at a moment's notice."

This may, at first sight, appear an impossibility in view of the time required by the great European nations to mobilize, but if examined carefully the problem can be shown capable of effective solution. From the German experience in 1870, and from what can be gleaned from the foreign press and from the reports on various recent peace-manœuvres, the time required for mobilization abroad may be set down at nine to ten days. In this one instance we have no need to copy, slavishly, Continental models, as the Volunteers have one great advantage over the armies of other nations. All the men are serving with the colours, and there is no time lost waiting for reservists to rejoin.

Mobile and Garrison Brigades.

Unfortunately we have no complete knowledge of the present official scheme of mobilization. We do not know what amount of

[1] English Army Corps, 32,000 men; French Army Corps, 36,000.

[2] An attempt to delay the French advance would be made by the rural inhabitants breaking up the roads under the supervision of the local magistrates and police.

[3] The dissemination of this order could be much facilitated by the great news agencies publishing the Order in Council necessary for calling out the Volunteers.

transport will be allowed to each battalion; we do not know where to get our ammunition and stores, we do not even know what stores we shall require, and we have no organized transport train or medical staff. All we know[1] is that certain brigades are allotted to certain places as garrisons, and that others are to form part of the mobile field army. This division of the force into garrison and mobile bodies is hardly in accordance with the teachings of modern war, for it stands to reason that if an enemy is once in the position to invade us and we lock up a large portion of our forces in strong places we are unconsciously playing into his hands. All he has to do is to avoid landing at a fortified port, and he has the game all his own way. The Duke of Wellington, writing to Sir John Burgoyne, in 1847, said that, with the exception of half a dozen places covered by defensive works, there was "hardly a mile of coast on which hostile troops could not be thrown ashore in any weather, with any wind and at any tide." And to prepare certain brigades solely for the local defence of certain fortified places would be merely to tie these troops down to spots which a rational enemy would sedulously avoid, a proceeding which would render such brigades of *very* negative value as factors in the defence of the country. It cannot be denied that the plan of drawing an *enceinte* round London is a very sound and rational idea, as the fall of London would only too probably be the precursor of the fall of England. But the converse is equally true. If England cannot stand when London falls, London is equally unable to resist if an invader is free to march at will throughout the length and breadth of the land. And to equip certain brigades solely for the performance of specific garrison duties round London is to glue them to the Surrey or Hertfordshire hills and to give the invader this very freedom of movement so essential to his success.

Mobilization to be Complete.

The plan too of pushing forward semi-mobilized troops into the immediate neighbourhood of an enemy, and of expecting them there to pick up their stores and transport, is an assumption which the French experience in 1870 should have exploded. In that year no German unit was allowed to go to the front until it was fully equipped with all requisites. On the other hand, the French War Ministry, instead of completing their mobilization at the home stations of the troops, forwarded men, stores, ammunition, and transport pell-mell to the front, in the vain hope that matters would come right so long as all the ingredients were there, and that these men, stores, and ammunition would somehow or other be able to mobilize themselves. How far this system was successful can be deduced from both French and German sources.[2] Men and officers wandered

The men would, no doubt be ready to mobilize at a moment's notice if the news were to appear in the midday papers. This, at least, in towns.

[1] War Office Letters, January 27, 1892, and January 5, 1891.

[2] "United Service Magazine," December, 1891, pp. 220 and 221. Telegram to French War Minister from General Michael, Belfort, July 21, 1870:—"Have

about hopelessly, trying to find their corps or regiments; stores destined for one force reached another; the railway stations were glutted, the lines were blocked, vast quantities of matériel never arrived at the front at all; whilst on the capture of Forbach, St. Avold, and Châlons, by the Germans, an enormous mass of provisions and war material was found, packed in railway trucks and inextricably jammed in sidings, which had lain there useless for weeks, and which eventually went to assist the very invaders it had originally been destined to repel.

Taking into consideration the lessons which experience has taught us, I venture to suggest that the only really sound and effective scheme of mobilization which can be of any practical use is one which provides that, whatever may be the duty of the unit in question at the outbreak of hostilities, it may be ready, as events develop, to "*go anywhere and do anything.*" We must, therefore, endeavour to devise some method whereby each brigade shall be able, at a day's notice, to set out from its territorial *rendezvous* fully prepared to act either as part of a field force or as a garrison brigade, as circumstances may require. But how are we to "fitly furnish forth" our Volunteer army to be ready to take the field fully mobilized at twenty-four hours' notice? What personal kit each man must carry, what quantity of reserve rations and ammunition is required, how the men are to be assembled, where the transport is to come from, what number of wagons each unit must take with it to the front, how supplies are to be managed, where entrenching tools are to be got, and whence medical comforts[1] are to be derived, are all questions which need the most careful consideration.

Personal Kit.

Let us first endeavour to arrive at some idea as to the quantity of stores and matériel which an infantry battalion of 800 men requires. The *impedimenta* which such a force must carry with it divide themselves naturally into two classes:

a. The articles carried on the person.

b. Those carried in the wagons.

The first of these offers but little difficulty. Most, if not all, Volunteer battalions are now fully equipped with leggings, greatcoats, valises,[2] mess tins, haversacks, and water bottles, and this equipment is amply sufficient to contain all the personal kit that the soldier requires in the field. The haversack will hold a knife and fork, a day's cold rations, and the little etceteras a man may want during the day. The valise[3] will carry a spare shirt, an extra pair of boots and

arrived at Belfort; have not found my Brigade or Divisional Commanders; what am I to do? I do not know where my regiments are." War was declared July 19, 1870, but mobilization had commenced on both sides some days earlier.

[1] I purposely omit all details as to medical stores. They can only be dealt with by a qualified medical officer.

[2] A valise, size of the 1872 or 1882 pattern, should be a *sine quâ non* for every efficient Volunteer.

[3] "Volunteer Regulations," 1891, Part 4, Section 3, para. 892, p. 224.

socks, a holdall, needles, thread, and scissors, brushes, soap and towel, a tin of dubbing, the cape, and if a large valise (such as those of the 1872 or 1882 pattern) the undress kersey as well. There is no need to take measures to provide these articles regimentally. Every man has a second pair of boots, or, at any rate, a pair of slippers to wear after the day's march, whilst the other articles are to be found in every household.

Ammunition.

Government provides the rifle and is likewise supposed to be responsible for the ammunition. But as the maximum annual allowance of ball cartridge is limited to ninety rounds per man, and as rifle practice usually begins about Easter, it follows that by the end of July fully half that allowance will have been expended and that probably not more than forty rounds per man are in store. There would be no time to issue a further supply, and even if an attempt to do so were made it is by no means certain that the necessarily congested state of the railways, or an active and enterprising enemy, might not render such attempt futile. This difficulty can be met by a step which is both effective and simple. If the War Office will sanction in any one year the issue of a double allowance (*i.e.*, 180 rounds per man) of ball ammunition, continuing in subsequent years the present annual allowance, the problem will be solved. The Volunteers, even at the end of the year, after all rifle practice has been completed, will have a reserve store of at least ninety rounds of ball cartridge per man, and this at no extra expense to the nation.

Baggage and Stores.

As regards the stores which are not carried on the person and the wagons in which they are conveyed, the problem is apparently not so easy of solution, though if carefully considered it really presents no overwhelming difficulty. We are confronted in the first place by two stumbling-blocks, which ought to be, but *have not been*, removed "by authority." We do not know the quantity of baggage which we shall be allowed to carry, and we have no information as to the number or description of the vehicles required for transport. We must, therefore, in this case rely on our own calculations.

One of the conditions of a sudden invasion is, that it is almost necessarily confined to the summer or early autumn, and as the invaders' control of the Channel would probably prove only temporary, the land campaign must be short and sharp, and would probably not last longer than two to three weeks at the most. Fighting in a friendly and thickly populated country, in summer weather, and with every probability of only a very short campaign, we shall be able to dispense with such luxuries as tents, blankets, and waterproof sheets. For prolonged operations, and with troops unaccustomed to "roughing it," as the bulk of our Volunteers undoubtedly are, the want of these articles might prove serious. On the other hand, we must not forget that the German troops in 1870 fought and marched hard

through[1] an eight months' campaign, much of it in the depth of winter and in a hostile country, without any such aids. We are, therefore, I think, fairly justified in assuming that under the probable circumstances of a surprise invasion, blankets, tents, and waterproof sheets may be safely left behind. The principal stores which would have to be carried with the brigade would thus resolve themselves into the officers' luggage, the two days' "iron rations," the entrenching tools, the reserve ammunition, the Quartermaster's stores, and the medical comforts, and having once determined on the quantity to be carried, the number and capacity of the vehicles for transport can be established with some degree of accuracy.

Movements by Railways.

The idea of concentrating troops round London and throwing on the War Office the onus of providing them with transport when they have reached their destination would, no doubt, greatly simplify matters. It would relieve Volunteer Commanding Officers of the responsibility of finding and transporting to their alarm posts the required number of wagons and horses, and it would enable the railway journey to be performed with somewhat greater ease and expedition, as a battalion would in that case require but one train to move it to its allotted station, and it would only be a matter of five to ten minutes[2] to entrain or detrain any Volunteer battalion whether there happened to be good platform accommodation or none at all. On the other hand, if encumbered with wagons, it would need at least two trains[3] to carry each battalion, and these trains could only be loaded and unloaded at places where the platform accommodation was ample. But, as I have already pointed out, it is contrary to the teaching of experience to attempt to complete the mobilization of any unit during its progress to the front. London can, no doubt, supply more than sufficient transport for the whole British army, but it needs no great stretch of the imagination to picture the hopeless confusion of this hypercentralization; the fruitless endeavours of the commanders to find their wagons on arriving in London; the in-

[1] War declared, July 19, 1870. Paris evacuated March 3, 1871.

[2] 5—10 minutes without wagons; 40 minutes with wagons.

[3] Train accommodation for a battalion of 800 men. *Cf.* Table A.

7 trucks carry 7 wagons (including Brigade Staff wagon).
2 „ „ 4 carts.
2 horse boxes carry 6 officers' horses and 6 men.
3 cattle trucks carry 20 draught horses and 6 men.
1 coach of five first-class compartments carries 30 officers.
19 coaches of five third-class compartments carry 760 men, *i.e.*, 8 men per compartment. These would be divided into two trains, as under:—

1st train:—5 trucks.	2nd train:—4 trucks.
1 horse box.	1 horse box.
1 cattle truck.	2 cattle trucks.
10 coaches.	10 coaches.
1 brake van.	1 brake van.
18 vehicles.	18 vehicles.

extricable muddle of this enormous mass of undisciplined transport and the inevitable delays which must ensue. It appears to me a far sounder and more rational plan to suffer no unit to leave its assembly post until fully mobilized. True, it would require more rolling stock to convey it to its destination, but we must bear in mind that ample rolling stock exists in England, that our railways are the best in the world, and that the delay of loading and despatching fully mobilized units would be more apparent than real. The railway companies in this country are accustomed to deal with an infinitely greater and heavier traffic than falls to the lot of any Continental line, and, with the cessation of civil traffic for a couple of days, we should have no lack of platform and siding accommodation. Besides this, the trains would be able to run at a uniform rate of speed, and there would be no waiting in sidings or on branch lines for trains of a superior class to pass. In place of the eight different classes[1] of trains which at present run daily over all our great lines, there would be but one class, the troop trains, moving at a uniform speed of 20—25 miles an hour. I do not pretend to any very deep knowledge of railway work, but I strongly incline to the belief that, with but one class of trains running, the time difference in conveying fully mobilized as against half mobilized units would be very small; and this difference, if any, would be more than compensated for by the readiness with which these units, when once detrained, could move into their respective positions.

Transport Train and Stores.

Basing our argument on this assumption, there remains to be seen what amount of transport each brigade would require. I do not want to take up your time by describing in detail the exact composition of the transport train or the amount of stores to be carried. A reference to Tables A, B, and C will explain my views on this subject better than any verbal description I could give. In drawing up these tables I have been guided by the data given in Lord Wolseley's Pocket Book (p. 29, *et seq.*), by the number of vehicles mobilized by way of experiment by certain corps in 1888, and by the German "Felddienst-Ordnung" (p. 118, *et seq.*).

I have endeavoured to distribute the stores and baggage in such a way that each double company may, by the help of its company store wagon, act for a couple of days, if need be, as an independent unit. In this company wagon are carried the two days' "iron rations," a small percentage of tools for camp or bivouac purposes, the company books and papers, materials for cleaning and repairing rifles, and the officers' baggage and cooking utensils. The Quartermaster's stores comprise the butcher's, carpenter's, smith's, and shoemaker's tools, and about 12 per cent. of reserve stores to supply casualties in the company wagons. The contents of the other vehicles speak for themselves.

The weight of the load in each wagon has been carefully kept

[1] Fast expresses, ordinary expresses, passenger trains, Parliamentary, mineral expresses, fish expresses, and two or three classes of goods trains.

below the full carrying capacity, partly because the stores, not being specially made to pack compactly, might exceed in bulk the cubic capacity of the wagon; partly because the wagons themselves, being built for civil traffic, might prove unequal to carry their full nominal load.

But there is one point in connection with the transport on which I have not yet touched, but which is of no small importance. Nothing has been said as to the means of procuring these wagons and horses. This problem I propose to solve by a system of registration. If every battalion will, in time of peace, register the addresses of the necessary wagons and horses, there should be no difficulty, in case of war, in being able to lay hands, at short notice, on all the transport it requires. The Army Act, 1881 (Secs. 112, 115, and 178), gives us full power, on being called out for active service, to impress whatever horses and vehicles we may need, and I am confident that it would not be a difficult matter to arrange with most, if not all, the owners, that their wagons, &c., should be available for at least two Saturday afternoons in each year free of all charge, except, perhaps, a small gratuity to the civilian drivers.

The experiment made in 1888 has shown that it is possible not only to raise battalion transport by borrowing the wagons and horses, but also to train Volunteers in the simpler movements of transport drill by means of blocks or models. One Saturday afternoon with the wagons would suffice to render the men tolerably familiar with the practical work, whilst the following Saturday could be devoted to the inspection of the transport train by the officer commanding the brigade. At these Saturday afternoon parades the ordinary civilian driver would be in charge of his horse and wagon, the Volunteer driver being mounted beside him to instruct him what to do and where to go on the various words of command. These Volunteer drivers should be men accustomed to horses, so that in case of mobilization they would be ready and competent to take sole charge of their wagon and horse.

In 1888 a grant of 45*l.* was issued to the battalions selected for the experiment, but in that year the wagons were required to spend three days in camp. There was, therefore, a considerable expense entailed, owing to men and horses being taken from their work for nearly a week.

The scheme I have suggested does away with this difficulty, as in the majority of cases Saturday afternoon is a half holiday; whilst the plan of drilling and inspecting the transport at the home station of each battalion reduces the expense and loss of time to a minimum.

By dint of a little tact and judicious selection, I do not anticipate that the cost of turning out the battalion transport twice a year would exceed 10*l.*; an amount which every battalion should be readily able to afford out of its capitation grant. And I venture to predict that if Government were to make the issue of this capitation grant dependent, amongst other requirements, on the production once a year of a certain number of wagons and horses,[1] it would not be long

[1] One wagon at least should be packed with the authorized stores. This regis-

before every Volunteer corps in the Kingdom would be in possession of its own battalion transport.

As regards the wagons for the Brigade Staff, the battalion whose home station is the appointed assembly post of the brigade should be charged with the duty of providing them.

There are two points, however, which a careful consideration of this subject brings into prominence. In the first place, Volunteer battalions are of two kinds: those corps whose men are all drawn from one town, and those having their companies scattered over a more or less extensive district. The case of the first is simple, as the transport train is organized, drilled, and inspected at the battalion headquarters. The case of a scattered battalion, an old "Administrative Corps," may appear more difficult to deal with, but if minutely examined the difficulty disappears. Most battalions of the old "administrative" class centre round some town, which is probably the headquarters and the home station of three or four of its companies, the remainder being outlying detachments. The readiest and most obvious solution of the problem is to throw upon this central town the onus of providing transport, which in most instances could be successfully done. There may, however, be some scattered battalions which, by reason of the dearth of towns in their districts, would be unable to raise the necessary number of wagons and horses at one place. Such, for instance, might be the case with one or two Highland corps. Here we might have to let each company find one or two wagons, whilst special arrangements would have to be made for attendance at united drill.

The second point which invites consideration is the question of the command of the transport when the brigade is assembled. Each battalion, as we have seen, provides, organizes, and drills its own transport, but when these battalions are brigaded, the whole of the wagons, horses, and men must be massed as *brigade troops* under a Subaltern officer specially detailed for the purpose. By this arrangement a considerable saving in fatigue is effected, as on the march the whole of the baggage and stores follow in rear of the column, and the men in summer are not harassed by clouds of dust raised by the heavy wagons; an economy in personnel and unity of command is attained; in case of contact with the enemy no time need be lost in clearing the way for the troops in rear to pass to the front; and, in action, the issue of the entrenching tools and reserve ammunition can be conducted with far greater rapidity and much less friction if the carts containing them are treated as a brigade unit.[1]

Finance.

As regards the stores needed in mobilizing a battalion, perhaps the first question which will suggest itself to the mind of the Volunteer officer will be the one of "ways and means." He may feel no

tration of horses and wagons should be separate and distinct from any similar registration for the regular troops.

[1] "Le Ravitaillement en Munitions." L. Baudoin, Paris, 1887.

anxiety about being able to obtain the required quantities, but he may, at the same time, be hampered in this "minor operation of war" by visions of future bills and dunning tradesmen. It may, perhaps, not be amiss to relieve this anxiety at once, by pointing out that under the Volunteer Act of 1863 a sum of two guineas is payable to each Volunteer on being called out for active service, and a further sum of one guinea on being released from the same. It will be seen, therefore, that provision has already been made for the wherewithal to purchase these stores, though I venture to suggest that it might facilitate matters somewhat if a clear and distinct understanding were arrived at as to the time and method of paying over this grant to the Volunteers.

The question of matériel having been dealt with, there remains the consideration of the assembly of the battalion; the means of rapidly calling out the men, of assembling the transport, and of collecting and packing the stores.

Medical Inspection.

But before proceeding to the discussion of the actual *modus operandi*, there are two preliminary points which need our consideration.

In the first place, every company must be divided into eight subsections, each under the command of a sergeant or corporal, and these subsection leaders must be provided with a squad book containing the names, occupations, and private and business addresses of the men of their respective squads. The object of this subdivision of companies is to facilitate the rapid dissemination of the order to mobilize, as it is intended that each subsection leader shall be responsible for imparting all necessary instructions to the men in his command.

In the second place, some provision must be made for the medical inspection of the men, as it would be manifestly unsound to take on active service men suffering from infirmities which would, after a day or two's campaigning, relegate them to the doctor's hands. Every battalion has, on an average, about three surgeons attached to it, and if we allow only two minutes for the examination of each man, it would take nine hours in a town corps, and, probably, a whole day in a scattered battalion, to ascertain the medical fitness of the regiment. This would be a very serious obstacle in the way of rapid mobilization, and some method should be devised of reducing this delay to a minimum. The only way out of the difficulty which suggests itself to me is, that authority should be given to Volunteer officers to impress the services of the nearest qualified civilian practitioners, at the rate of two per company, at a fixed fee, this fee being defrayed out of the Mobilization Grant authorized under section 18 of the Volunteer Act of 1863. These two surgeons would be able to complete the medical inspection of a company within two hours, with comparatively little interference with the general work of mobilization, as the men would not arrive at the company assembly post *en masse*, but

singly, or in batches of three or four, and could thus pass through the surgeons' hands with practically no loss of time.

The Order to Mobilize.

We are now clear as to what stores we require and how they are to be obtained; we have got our registered transport; we have provided for the medical examination of the men; and we have divided our companies into small handy squads of a dozen men each. Our remaining task is to devise some means for the dissemination of the order to mobilize, and to lay down the exact duties of each man on its receipt. For information on the first matter I invite your attention to Table D, which shows the systematic descent of the mobilization order from the Brigadier to all concerned. In connection with this I would mention that the distribution of the order, apart from the help the newspapers might give, should be effected by the most rapid methods available. Messengers—mounted or on foot—telegraphs, railways, horses, cabs, tramcars, telephones, and every available means for the swift transmission of the news should be made use of without stint. In the case of the private soldiers, the subsection leaders should, if possible, warn every man personally, and obtain his signature to a printed form showing that he has received the order; in the case of the officers and non-commissioned officers, the receipt of the order should also be acknowledged to the sender, so that, in the event of any accidental break in the chain, measures may at once be taken to supply the missing link.

Duties on Mobilization. V.M. Forms.

In order to show clearly the place and duties of every man in the mobilization scheme, I have devised a series of forms which I have taken the liberty of calling V.M. (*i.e.*, Volunteer mobilization) forms. These forms are printed on paper of different colours, and are kept in the possession of the officers and others, or in some place readily accessible at all times to those concerned. For the mobilization of a brigade there are 5 series of V.M. forms. Series 5 contains instructions for the brigade Staff; Series 4 details the work to be performed by the battalion Staff; Series 3 deals with the collection of supplies; Series 2 with the assembly of the transport; and Series 1 with the mobilization of the company officers and men. I have appended to the names of the officers and others in Table D the number of the V.M. form applicable in each case, in the hope that the work devolving upon each man in mobilizing the brigade may be seen at a glance.

Mobilization of the Men.

Let us deal first with the assembly of the company officers and men. For each company a special assembly post is fixed: in a town battalion, a street contiguous to and easily accessible from the battalion headquarters; in a scattered corps, probably the drill-shed in the

village where the company is stationed. Every company commander is provided with three V.M. forms, one showing the duties which devolve upon himself, his subalterns, his permanent staff sergeants, and his colour sergeant; one detailing the work to be done by the subsection leaders; and one giving *in extenso* the instructions for the rank and file.

On receipt of the order to mobilize, the company commander consults V.M. Form 1, where he finds in consecutive order the duties to be performed in mobilizing his command. His first care is to acknowledge receipt of the order; he then warns by messenger or telegraph his subordinate leaders and obtains their acknowledgment of the order. Instructions are next found for his own personal equipment and the amount of baggage he is recommended to take with him to the front, and finally he is bidden to betake himself and his *impedimenta* to the company assembly post and there to superintend the gathering together of his men.

The subsection leaders' duties are similarly detailed on V.M. Form 1A, whilst the instructions for the rank and file (V.M. Form 1B), of which a sufficient supply should be kept at all headquarters, set forth in detail the course to be followed by the men.

The moment the company is mobilized, which should be done with ease in from six to eight hours, the company commander will notify his Colonel of the fact, and will move his men by road or rail to the battalion assembly post. This point, it is hardly necessary to say, will be the battalion headquarters in the case of a town corps; the central town where the transport is being assembled in the case of a scattered battalion.

Mobilization of the Transport and Stores.

Let us turn now to the assembly of the wagons and stores, the matériel necessary for mobilization. Our work here is to call together the transport train and to collect the provisions, stores, and reserve ammunition, for which the Quartermaster and the senior transport sergeant must be held responsible. For this, two series of V.M. forms are necessary, one for the assembly of the transport train, the other for the collection of the stores.

V.M. Form 2 contains the instructions for the transport sergeant, who is charged with the duty of transmitting the order to the drivers. V.M. Form 2A deals with the duties of the drivers of the company store wagons, V.M. Form 2B with the Quartermaster's stores; V.M. Form 2C treats of the tool carts, and V.M. Form 2D of the ammunition carts. The mobilization of the battalion ambulance wagon and stores (V.M. 2E and V.M. 3E) I purposely omit, as they are matters which require special technical knowledge.

Without attempting to explain these forms[1] in detail, it may be

[1] Appended are a few specimen forms showing how the *men* of each company are assembled, how the *horses and wagons* are mobilized, and how the company *stores* are collected. From these specimens the remaining V.M. forms can be easily compiled.

stated that, broadly speaking, their effect is as follows:—The driver, after packing his valise, proceeds to a certain address where he finds a wagon and horse waiting for him, the owner having previously been warned by telegraph to have them in readiness. With the wagon he drives in a given rotation to sundry places, which are named on his V.M. form, and finds at each a certain quantity of stores which have been ordered by the transport orderly, and which are packed into his wagon. This completed, he returns to the battalion assembly post, takes ground in a street previously arranged for, and reports his arrival to the battalion transport sergeant. The procedure of the transport orderlies, that is, the men whose duty it is to procure the stores, to help in their loading and unloading, and whose place is on the box seat of the wagon next the driver, is very similar. These duties are dealt with in Series V.M. 3, which corresponds to Series V.M. 2, the battalion Quartermaster taking the place of the transport sergeant.

It may be noticed that no account has been taken of the baggage of the battalion Staff. This omission I may state is an intentional one, as, for mobilization purposes, all Staff officers and non-commissioned officers should be attached to some company, thereby avoiding the necessity for organizing a special Staff detachment and wagon.

In the case of the brigade Staff, certain men would have to be detailed for its mobilization from the most conveniently situated battalion, which would be unavoidably deprived of their services so long as the brigade remained mobilized. But as the number of these men would not amount to more than a dozen (officers' servants included), the loss to the battalion is hardly worth consideration.

In attempting to describe the process of mobilization, I have of necessity been obliged to explain the duties of the various fractions one by one, an operation which I fear has occupied some time. But in case of actual, or even of experimental, mobilization, it must not be forgotten that the various parts of the process would be in action simultaneously, and I believe that the time required to turn out a battalion fit to take and keep the field would in all probability not exceed twelve hours.

I have refrained from inflicting on you the V.M. forms for the battalion Staff. From the forms you have before you there can be little difficulty in devising suitable instructions for these officers. They would be merely a modification of portions of Form V.M. 1, as the only information they need contain is a list of the kit required on service, and the indication of the point selected as the battalion assembly post. Forms for the brigade Staff can be prepared on similar lines; to trouble you with them now would be a vain repetition.

Concentration of the Brigade.

But there is one matter which I promised to deal with, and which I have as yet left undone. I have shown how transport and stores can be obtained, and how the personnel of a battalion can be mobilized, but I have left each mobilized battalion at its own assembly

post. No attempt has been made to assemble the brigade in one spot. This is no accidental omission, but one of "malice aforethought." We are dealing with the hurry and turmoil occasioned by a sudden invasion, when probably every hour saved would be an hour gained. We have in England a network of railways unequalled in any other country, and as every effective scheme of mobilization must be based, not on arbitrary military districts, but on the great railway systems of the kingdom, it may be an actual saving in time to convey the various battalions composing a brigade direct from their battalion assembly posts to the point of concentration without entailing on them the trouble and expense of a previous railway journey to the brigade *rendezvous*. If an attempt at invasion were dependent on the defeat of our fleets, there might then be an advantage in having the brigade assembled in one town, but in that case there would be comparatively ample time to effect this local concentration.

Conclusion.

In the scheme which I have endeavoured to outline this afternoon there may be details capable of improvement, and there certainly are many faults of omission, but I believe that, taken as a whole, it is a simple, sound, and workable scheme. It is simple, because it recognises the great modern principle of division of labour, and lays down for every man exactly where to go and what to do when the order to mobilize is received. It is sound, because it accepts the Volunteer force as it actually is, and not as an ideal military body; and it is workable, because it entails no superhuman amount of labour on any one man. It is a scheme which can be practised in skeleton in time of peace without undue expense, and I am confident it is one which, if thus practised every three or four years, will place the Volunteers in such a state of readiness for war that when the day comes when a hostile army sets foot on our shores, every Brigadier will be able to report his command ready to "go anywhere and do anything" within twenty-four hours of the receipt of the momentous telegram

"Mobilize."

Major EUSTACE BALFOUR: I do not rise so much to offer a few remarks from the point of view of criticism as to emphasize the importance of some of the things Captain Sichel has said. I think we suffer from not having a complete understanding of what I may call the reality of the possibility of invasion. I therefore welcome specially in Captain Sichel's lecture the able way in which he has put forward two possible ways in which invasion may occur—invasion after defeat at sea, and what he has aptly termed a surprise invasion. I may say I have had, during the last few months, a considerable controversy with a certain sailor in the "United Service Magazine" on this subject, and perhaps I feel the importance of it more keenly on that account. I think if we fully realize the exact meaning of London being a vital point, in other words, if we imagine for a moment an enemy here, in Whitehall, operating upon the Admiralty telegraph, sending orders to different naval stations, in fact, possibly ordering fleets away from our coasts, we may see that this surprise invasion is by no means the chimera that many naval writers especially, and many writers in the daily Press, try to make out that it is. If, then, that contention is true, it is perfectly clear that the lecturer's contention is equally true, that

it is absolutely necessary for us Volunteers, if we are to be called an army at all, to be able to mobilize in 24 hours. I think I might venture, without divulging secrets, to say that it was not so many years ago—it was since 1882, during those few months when General Boulanger was really a power in France—the Government of this country seriously considered not only the possibility but the probability of such an effort being made. Now, to pass to a few details which I should like to touch upon in Captain Sichel's paper. He mentioned that boots were not required to be served out to Volunteers on mobilization. I do not know what his experience is, but the experience we have in our own battalion, and I daresay other Volunteers will say the same, is that a large number of men have not got boots as their private property sufficiently strong for the work of a campaign, and that it is a matter which Commanding Officers might look to. I do not think it need cost any money, either on the part of the privates or the Government, but I think Commanding Officers might possibly manage to induce their men, when they get their next pair of boots, to buy boots suitable for that sort of purpose. I do not think that the lecturer quite does justice to what might be called the depôt system. If I recollect right, his brigade assemble at Tilbury in Essex. That is a long way off, and the brigade would have to go there by train, but in our case we assemble at Caterham, and it seems to me that there is a possible advantage in centralizing stores at Caterham. It would certainly save a large quantity of transport. The Caterham depôt might be directly under the command of the Brigadier and transport officer of the brigade, and if that were so, and it were perfectly certain that our point of assembly was always to be at Caterham, both the ammunition and the heavy baggage possibly might with advantage be stored there instead of being distributed by battalion. I only throw that out as a possible suggestion; I have no strong view one way or the other. He mentions that military volunteer drivers would be required having a knowledge of horses. I am afraid that is a difficulty which might arise practically. In the country battalions, no doubt, you would find plenty of men who were good drivers, but I rather doubt if you would find a sufficient number who had a thorough knowledge of horses in London. The medical inspection that he dwelt upon is an excessively important subject. I confess I would rather have a yearly medical inspection of a volunteer corps than put it off to the last moment, although there are serious objections to it. The only other point is one that, I think, possibly you, sir, feel, and that is the size of brigades in proportion to the Staff which has to work them. This is perfectly obvious in the case of the South London Brigade. It is the size of an infantry division, and, although it is perfectly easy to manage in peace-time, I think, in case of mobilization, the Staff would have to be enormously increased, and that could not be done probably at a moment's notice. In making these few criticisms on little points that have occurred to me, I may say that I entirely agree with almost all the main contentions of the lecturer.

Major JOHN FORMBY: I think there can be very little dispute as to the able way in which Captain Sichel has put before us the very sudden urgency in which troops for the defence of this country might be wanted. But I should like to go a little further into the meaning of the word "mobilization." We are told that the Volunteer forces are mobilized and formed into partly field army and partly garrison troops. But it seems to me, so far as I can make out, that it might be more fitly described as garrison duty near their own homes, and garrison duty in some other part of England, because when an army is told off beforehand to the defence of certain predetermined places, for instance, for the defence of London, it ceases to be mobile. There is an old proverb that there are more ways of killing a cat than choking her with cream, and Marshal Von Moltke's scheme for the last German war was, in the first place, to get possession of the enemy's capital, but his means of doing that were to defeat the enemy's main army by the destruction of the enemy's troops. And the late Prince Hohenlohe, in his "Letters on Strategy," shows over and over again that, for the purposes of the defence, it is better to go for the enemy's army than to garrison certain predetermined points. Therefore, I cannot help thinking that the first thing to do would be to make the army mobile, because mobilization does not mean locking troops up, but enabling them to go anywhere. Practically, it would come to this, there would be the first Regular army corps, which would comprise, perhaps, two divisions of the present first army corps, and if

another division were formed out of the nearer parts of the fifth and sixth divisions it would make a whole army corps, close to London, which could be raised almost at 24 or 48 hours' notice, and it would then give a powerful support to mobilization, because a sudden dash, say, at a place like Swindon or Didcot, and then across to the North Western Line by a short cut, might break up our whole scheme of mobilization to the west and north-west. Behind this the other Regular army corps and the Volunteer army, in fact, not only the Volunteer forces, but all the forces as they were wanted, could be mobilized as quickly as possible, and those first mobilized would form the first army, and the rest would be formed under their protection. In that case it would be, perhaps, a better plan that the names of the mobilization points should as far as possible be kept secret, or absolutely confidential. Then only those who had the management of the work would really know the details. The mobilization itself should be by districts, and then, by the manipulation of the great trunk lines, the troops, when wanted, could be forwarded by those who had the requisite knowledge to the required places. Our lecturer based some of his calculations on the unequalled facilities for transportation possessed by our English lines. I fancy that, with the exception of those lines which are used to take troops, we should find a railway a broken reed to rely upon. He mentioned the great numbers that are carried by our railways. I have seen over 130,000 people brought into a town before half-past 11 in the morning, but they were not troops. If I may draw a little on my own experience, and I dare say most people in this room could give a better illustration, I might say that the officials of many of our railway lines have not the most shadowy conception of the requirements of moving troops. I was acting transport officer to Major-General Thackwell, with the old Mersey Brigade, some three or four years ago, and we had eight regiments to move from two stations, at one of which the luggage was loaded, and at the other of which most of the troops were loaded. They did not seem to think that it was of the smallest consequence that the troops should go even by the route that had been laid down for them, or whether one battalion took the horses and baggage of another or not. On one occasion a train ran through Llandudno Junction Station, where I was expecting that it would stop to pick up the horses and baggage. I saw it coming up at full speed, and turned round to the station master and asked him to stop it. He let it run through, and I am afraid I was a good deal vexed. He then said, "Really, sir, why do you make such a fuss? You have another train going to the same place in about an hour," and he could not and did not see that both of those battalions would be utterly useless for hours after reaching their destination. I have no hesitation in saying that fully 50 per cent. of that brigade could not have been moved that night after they reached their destination. The next year, on the same service, I wrote to the district superintendent a week beforehand, and called on him in his office and put the matter before him, that we really must manage it differently this time, and I believe any one of the battalions could have marched within a quarter of an hour of arrival at their destination, and they did so arrive within about a quarter of an hour of the time which we had calculated. Then there is another matter which I wish to add, that is, it is supposed that the brigades were formed for the purpose of teaching mobilization in peace-time, and that transport officers were attached to them for the purpose of learning mobilization, or rather, concentration of troops, which is the first step in mobilization. But we are specially forbidden to practise concentration, because it is laid down that all the troops should be moved into brigade camp by their battalion commanders only, that is, concentrated at haphazard. Concentration is the work which I claim is the most valuable: that is the work which we ought to learn. Another part of our work, we are told, is to keep up the transport, and when we enquire about it we are told that we need not bother our heads, because we have only to wait till we get to our journey's end and then scramble for it. I asked an officer high up on the Staff about that, and he shrugged his shoulders and said, under such a scheme the confusion would be more easily imagined than described, and that he had no hesitation in saying that if more than two brigades were concentrated in any town, they would not be able to move troops for three days. I hope a little experience of working may show us, and that we may be allowed to attempt to learn (by making mistakes, certainly, but it is better to make mistakes in peace-time than in war-time), how to concentrate our brigades,

which is the first beginning of mobilization; that is to say, to make arrangements for arriving in perfect order, ready to move when they get to the other end. If we could be sure that the brigades were really formed as a field army, and made mobile to be concentrated wherever they may be wanted—since it is not quite certain that any point on the Kent or Sussex coast will be the real landing, for there may be other ways of doing it—they would then get confidence. This subject is no new thing mentioned in this theatre. I was reading Colonel Cave's excellent lecture on Volunteer Transport a little while ago, in which he scouted the notion of the Volunteer forces being only used to stay in trenches, and said, if that were done it was not of any use keeping them up. I believe most officers who have had large numbers of Volunteers under them have testified of these men that, though they have not very great opportunities of learning, yet they do their very utmost to do so, that they have met unaccustomed situations, or situations of which they have only a theoretical knowledge, to the best of their power, and also learned very quickly, and that they are, at all events, worth training, so that 100,000 men may be made into a really mobile field force, not one which is to be put into a place, and which never will dare to attempt to move out of it. If the latter is to be the case, I cannot help thinking that the Volunteer force requires a great deal more mending than any of us think.

Colonel CAVE: I purpose, as Major Balfour has done, to speak more of the general principle than to criticise the details of Captain Sichel's very excellent paper. To some extent, I dealt with the same subject myself, here, a month ago. With regard to mobility, there cannot, I think, be the least doubt in the mind of any one who has ever brought, I won't say military knowledge to bear, but common sense to bear upon the subject, that it is not only desirable but absolutely essential to any force that is to be of any use at all. I think it will rather clear our minds in the matter if we divide the subject of mobility into two parts, the first part the bringing troops together with all the necessary material to take the field, and the second part, what I call field mobility, that is, organizing them so that they can move anywhere after they are concentrated. In both these things it appears to me we have a very great deal yet to do before we can not only be said to be perfect, but before we can do anything at all in that direction. Captain Sichel has dealt very fully indeed with bringing troops together. I think his mobilization forms might be somewhat simplified, but they are undoubtedly in the right direction. In the brigade to which my own battalion belongs, we have forms very much of the same nature, and we have, on two or three occasions, practised the mobilization; in times of peace it can be done in 24 hours. In times of war, where men, of course, would be able to leave their work at any time, it could be done somewhat more quickly. With regard to mobility after they are concentrated, drawn together in either battalions or brigades, it is quite certain that if the force is only capable of occupying a defensive position, as suggested by the military correspondent of the "Times" on what he saw last Easter, it is absolutely useless to maintain it. I do not say, and I am not here to boast, that the force is capable of anything more, but if it is not, and if it is impossible to make it capable of such a mobility that it can attack, that it can move, if necessary, 100 miles by road, and can move anywhere at any time, it is no use at all to maintain it. It is therefore no good, in my humble estimation, to say that we should only learn to defend certain positions. I am not at all clear that it is a bit more easy, I think, in fact, it is more difficult, to occupy defensive positions scientifically than it is even to attack, but if we are only capable of being glued, as the lecturer very well puts it, to Surrey or the Hertfordshire hills, we are no use at all. The problem is, how we are to be made sufficiently mobile, after we are brought together, to be able really to take the field. I venture to think that the scheme for mobilizing an army of defence as it is laid down in the official tables is really a mistake. There, the whole, or practically the whole, of the available Regular troops are organized into two army corps. That would leave the balance of the auxiliary forces, much the largest part of the force upon which we are depending for the defence of the country, to operate entirely by itself, not, as it were, to have its back stiffened by Regular troops. I think the problem that the authorities and we ourselves should attack is how to organize, concentrate, and render mobile army corps composed of a mixture of Regulars, Militia, Yeomanry, and Volunteers. If army

corps were constituted somewhat more on the principle of having, we will say, two divisions of Volunteer infantry and one division of Regular infantry, or, perhaps, in some army corps, two divisions of Volunteer infantry and one division of infantry consisting of a brigade of Regulars and a brigade of Militia, I think it would very much go to stiffen the back of the force and would be more likely to make a really efficient army of defence. There is one thing that is constantly put before us, a general idea that the first line, that is to say, that those troops that would be ready first of all to contend with the invader, would be the Regular troops. Now I cannot help thinking that is a very great mistake. It will take very much more time to mobilize the Regular troops, with the one exception of the brigade of Guards, than it will to mobilize the Volunteer troops. What are the regiments of the Home Service? Many of them are not more than a couple of companies on a war strength, and they will not be anything like up to their fighting strength till the Reserves are called up. In those Reserves the men have, for the most part, been one, two, or even three, years away from the colours, absolutely without any training at all. Surely it will take a longer time to bring them together, equip and get them into fighting trim than it would to put the Volunteers in the field, who are, as the lecturer observed, always more or less with the colours. Of course, the Regulars will be by far the most efficient when they are ready to take the field, but the Volunteers will be ready first. I think that should be borne in mind. Moreover, surely I am not wrong in thinking it is a general principle with great Captains to keep their very best troops in reserve; we read of Napoleon that his Old Guard was always the trump card that he kept up his sleeve. The principle is, if your front line is shaken, you must have the most reliable troops possible, whose *morale* can stand the reverse of the front line to fall back upon. I think to put the Volunteers in the position of the Old Guard is a mistake; you want the Regulars for the second line, and I cannot help thinking, such is the constitution of the force and the difficulty of mobilizing, that it would be really they that would be in the second line. Of course, to arrive at this mobility we must have an organized transport. In this theatre, a month ago, one officer very strongly held to the idea that the railways could do all that was necessary. I am glad to hear the experience of Major Formby, because that is exactly in accordance with my own, that the railways are a very rotten reed to depend upon indeed. If you had nothing but infantry soldiers, without even the officers' chargers, you might be able to entrain and detrain them without difficulty; but it happened to me, only at Easter last year, that I got my battalion of men detrained in a very few minutes, but it was nearly an hour before we could get the officers' chargers. With all the paraphernalia and the enormous number of horses for a mobilization of large forces, that difficulty will increase tenfold. I would like to add with regard to these schemes and these ideas of organizing transport to make the force mobile, they are all good, and the more we can ventilate the subject the better, but the one thing we must arrive at is practice. Unless we call these registered horses, &c., out occasionally, unless we put them in the field, unless we get large forces in the field, it is really very little use; it is a very easy thing to move a company, a moderately easy thing to move a battalion, even a brigade is not a very great difficulty, but it is when you come to an army corps, when you come to all the enormous convoys that have to follow in the train of large forces, it is then that the difficulty really arises, and unless we occasionally practise that in times of peace we shall be certain to be in great confusion in time of war. One word upon the expense which, unfortunately, is always a difficulty with us. I have never, as yet, been able to understand what is the supposed use of the two guineas that are to be paid, I suppose, to the funds of a corps, though the regulation does not seem to be very clear that it is not to go into the pockets of the men. The two guineas are to be paid upon the mobilization of the Volunteers. What are we going to do with it at the time? It appears to me to me to be a sort of deferred liability of the Government. It will mean that on calling out the Volunteers they will have to plank down half a million, and what good are we going to do with the half million when we have got it? We probably should not get our draft till we were actually in the field, and I am sure I do not know what we are going to do with it. What we want is the necessary material to take the field, and we want it in time of peace. We do not want two guineas to buy it with when it is too late to get it. That deferred

liability of half a million would produce in interest about 15,000*l.* a year. Strike the liability out of the regulations and let us have the 15,000*l.* a year for transport to see what we can do with that.

Captain H. J. FOSTER, R.E.: I should like to make a few observations in detail on the remarks leading up to the subject of the lecture. The effort of the lecturer is to show that we are in great danger of a sudden surprise of invasion. The lecturer says that in 1882 the French had four corps mobilized in the north of France. I was under the impression that till three or four years ago, when they mobilized the 17th Corps at Toulouse, no Continental army had ever been mobilized except for war, so that I am very much surprised to hear that there were four corps mobilized in 1882, and I should like to know the authority for that statement. There is no record that four corps were ever mobilized in France in 1882. Another point is, as to our naval force at home while our Mediterranean Squadron was at Alexandria. I have very good naval authority for saying we had in the Channel Squadron, and in the Reserve Squadron, twelve ironclads actually available, besides other ships which would have been got ready, had the French attitude been as threatening as it would have been if four corps had been mobilized close to our shores. I think those two considerations make the whole of that 1882 business really rather a fancy picture of the danger we were in. After that it seems hardly necessary to dwell long on the advantage the lecturer has given to our assailants as regards the time he would make them invade us in. The 36 hours that he gives for bringing the army corps to their ports of embarkation seems a very short time, and the rate of landing on our shores is also very rapid—to land three or four army corps in 12 hours.

The CHAIRMAN: I think all these statements were simply as to what was possible.

Captain FOSTER: The fact of the army corps not having been mobilized, if I am right, is really the important thing. The whole of that picture should be expunged from your minds when you are thinking of the possibility of invasion.

Captain SICHEL: The four army corps in the north of France were not fully mobilized; they were partially mobilized. The officer on whose authority I make that statement is Captain Maude, who was in France at the time.

Captain FOSTER: I never heard that.

Captain SICHEL: In recent cases corps have been fully mobilized: in 1882 they were partially mobilized.

Captain FOSTER: It would require for that that the Reserves should be added to bring the corps to war strength, and an enormous additional supply of horses would be required to form the cavalry at war strength, to horse the artillery, and to supply a certain amount of transport. You said "fully mobilized."

Captain SICHEL: To all intents they were fully mobilized, because a French army corps would require less train; they would not require so many horses.

Captain FOSTER: Of course if they are coming over without any impediments, I have nothing more to say on that point, but the time of landing seems very short.

The CHAIRMAN: The great question we are discussing is mobilization, which the lecturer was perfectly at liberty to bring forward in the strongest way he could, even though it might be a little stronger than could be actually borne out in practice. He wanted to put the strongest point forward to show the necessity for mobilization.

Captain FOSTER: I was anxious to minimize the picture drawn of possible invasion. I think a great deal of mischief would be done if it is given out from this theatre that this is at all a likely picture of what would happen.

Mr. H. O. ARNOLD-FORSTER, M.P.: I do not know that I ought to take any part in this discussion, but one or two points have been raised upon which I should like to say a few words, as Captain Sichel was good enough to ask me to speak. This is a subject so certain to interest a very much larger number of persons than are usually interested in military subjects, simply because it happens to apply to the Volunteers, who form a large body of the general public, that it would be most unfortunate if any misconception were to go out with regard to the conclusions we arrive at. If it be the fact, as we are led to suppose by the paper, that no provision at all has been made by the War Office authorities similar to that which is recommended in Captain

Sichel's paper, I think that is a fact that cannot be too soon or too widely known by the public in general; because if that were the case, it would mean that the Volunteer Force, which I think has always received a very scant meed of justice from the War Office, had been condemned to utter impotence by the absence of any effort on the part of the proper authorities to make it possible that the force should take the field. But I cannot believe for a moment, and I think Captain Sichel will tell me if I am wrong, that no attempt has been made to provide an organization for the Volunteer Force similar to that which he has recommended here. I take it that the difference between the organization which I sincerely trust exists and that which Captain Sichel recommends is that the official scheme of mobilization, which I have no doubt is carefully sketched out, and which every Volunteer officer here is thoroughly well acquainted with, and prepared to carry out the moment he receives his instructions, is calculated to take effect at a later interval of time than that which is suggested by Captain Sichel. And if that be the case, I think there is no doubt room for argument that the state of things is not quite so serious as Captain Sichel would lead us to believe. But if it be true that there is nothing corresponding to the plan which has been suggested by Captain Sichel, then it does seem to me that it is high time that the public should be made acquainted with the fact. But I should like to say a word with regard to another aspect of this question. With great respect for the last speaker, who, I think, might with advantage have been allowed to give us the facts about the time required for the disembarkation of troops, I would take exception to one statement he made, and that is with regard to the condition of the fleet at home at the time of the bombardment of Alexandria. I was very intimately acquainted with the condition of our home naval resources at that time, and I am afraid that the picture that Captain Sichel draws is unfortunately only too true, and that we were so ill-equipped in the matter of naval defence at home, that it would have been a very serious difficulty to have resisted any attempt if it had been made. At the same time, I do think it ought to be borne in mind that the whole essence and point of this paper, the only thing which renders extraordinarily rapid mobilization essential, is the supposition that a surprise invasion can take place. Of course, it could take place if every facility were given. That troops could be landed anywhere on our coast, with the exception of three or four selected places where strong fortifications exist, is a fact I do not suppose any officer would question for a moment. I have been down to see the operation, and probably many here have been down to see the operation, of landing troops opposed by a land force. Everybody knows that if troops attempt to land in the face of fortifications which have taken four or five years to erect, they will fail. But while it is true that our present torpedo defence combined with land fortifications might destroy any naval force brought to bear upon those fortifications, still an enemy has only to make use of steam transport, and take his force 6 or 7 miles down the coast to enable him to land his troops, under cover of such an artillery as would be absolutely irresistible by anything which could be brought to bear against it. In such a case, you could land any number of men you chose, provided the day were calm, and the sea favourable, and that you could keep them protected by the guns of the covering squadron. There is one remedy, and one remedy only, for that situation, and I do think, with great respect, that Captain Sichel should have turned a little more attention to it before he recommended this very heroic remedy in addition, and that is, to have an overwhelming naval force always in our ports or close at hand. I would undertake that I express the opinion of any expert, either naval or military, when I say that the landing of troops, under the cover of any squadron, from transport and merchant ships is absolutely impossible, provided a concurrent attack is going on by a properly equipped and properly led naval force. And if we allow such a condition of things to arise as Captain Sichel has suggested when there is a proper naval force in our ports and home waters, we have no one but ourselves to thank. I think every naval man, and a great many military men, will agree with me in saying the first and last way of preventing a surprise invasion is to have a strong naval force ready to go to sea in every one of our military ports; and as long as we have that, the idea of landing troops crowded together in the transports and ships that Captain Sichel speaks of as likely to come from the other side of the Channel would be impossible. The

destruction of life that would be caused by the torpedoes and quick-firing guns that would be brought to bear upon such transports, or a fleet of that kind, would be such that no Commander would undertake the responsibility of such an attempt. Therefore, although I congratulate Captain Sichel upon his exceedingly valuable and well worked out paper, I must respectfully ask him to tell us whether, in his opinion, this paper depends for its value upon the rapidity of mobilization which it suggests, or whether it is the first essay towards the performance of a task which the Government ought long ago to have undertaken, and which we assume they have undertaken. Whatever be the case, I still think it would have been better if he had put a little more stress upon the point to which I have called attention, namely, the increase of the naval force.

Captain FOSTER: May I ask if Mr. Arnold-Forster has calculated the relative cost of the plan as proposed by him and the plan of the lecturer? In one case it will be millions, and in the other a few thousands.

Mr. H. O. ARNOLD-FORSTER, M.P.: I do not think any cost would be too great in order to attain the object in view. To pay a very large sum to effect your object may be cheap; to spend a very small sum, and to fail in securing your object, may be very costly.

Lieutenant T. W. HEATH: I think it is a matter of congratulation to the authorities to have amongst the Volunteer Forces such worthy officers who favour us with such excellent lectures on this very important subject as Colonel Cave and Captain Sichel. It shows that the authorities have looked in the right direction for men who will do all that they possibly can for the advantage of that particular branch of the Service of which we form a part. I was very glad to be here to-day, and also to hear the general tenour of Captain Sichel's ideas with regard to mobilization. It appeared to me, from the remarks made when Lord Methuen was in the chair, that there was no chance of our getting any grant from the Government for the purpose, but that we must depend upon ourselves, and upon the voluntary efforts of Volunteers. I may mention just shortly that I have tried the experiment of registration with my regiment (18th Middlesex R.V.C.), and we can now at any time, within a very few hours, have fully-horsed wagons to move 800 men anywhere in England, and that has cost nothing but the simple registration. I think every regiment in every brigade should have a registered transport of its own, near its headquarters, because otherwise, in case of war and a sudden call for transport, various regiments would be seizing the same horses and wagons. The advantage of registering is that each one would go in his own direction, and would be able to call upon his registered transport at a very short notice. The lecturer refers to this when he is speaking about the transport train and stores. I have proved the efficiency of his suggestions, and the practical advantage of actually forming such a corps, myself. With regard to entraining Volunteers, at our Easter outing we had six strong regiments. The brigade numbered 2,400. The whole body was passed out of Canterbury Station at intervals of 10 minutes to a regiment, including the baggage. The whole of the detraining was done on an average of 10 minutes to a regiment. That may be an exceptional case, but it shows that railways can sometimes do their work properly. Lieutenant-Colonel Lloyd, Transport Officer, North London Volunteer Brigade, made the arrangements with the South Eastern Railway. I think I can answer one point, as I happened to be present at the time. The idea was, in calling the regiments up for garrison duty, to allow them to keep on duty one-third of their strength, and to permit the exchange of duties within themselves, so that they might always keep a certain proportion on parade. On, I won't say an actual declaration of war, but on a threatened invasion, if there is good cause for the Government to call out the Volunteers, each regiment should be allowed to keep on parade 300 men out of 900, and allow exchanges regimentally, so as to keep up the strength for garrison duty.

Mr. SPENSER WILKINSON: The lecturer begins by asking the question, why the Volunteers should be mobilized, and that naturally leads to the discussion of the possibility of a surprise invasion. I do not propose at present to go into that question beyond saying that my experience of any attempt to find out what the Volunteer exists for invariably leads you to suppose that he ought to be ready to fight at some time. When you come to the conditions under which the Volunteers would have to

be ready, you are brought to the surprise invasion, and when you have gone thus far, you always say to yourself, what the country really needs is a tremendously big navy. I am rather sorry that these preliminary questions form part of the discussion as to how you are to mobilize the Volunteers. As far as I have been able to gather, there is at present no established and regulated method by which the Volunteers are to be mobilized. I believe the Volunteers to be a force very imperfectly trained and moderately equipped, with an ultimate view to some sort of warlike operations that they are to perform; but, as far as I know, there is not any single instruction or regulation which explains to them how they could put themselves into a state of readiness for war. As far as I am able to find out, no Volunteer officer at this moment could answer the question, "If your regiment is going to fight, where are you going to get your cartridges from, where are you going to get the various necessaries which you require?" And as far as my knowledge goes—I may be a little out of date, because it is some years since I was a Volunteer officer—there is no means of getting that information at present. I understand Captain Sichel to be pointing out a system which he thinks it would be very desirable to introduce. There does exist something very different. There does exist a scheme which sets forth certain operations for moving to various points in the country certain imaginary Volunteer units which do not in practice exist. They exist as unmobilized battalions, but there is no means established by regulation of converting them into battalions ready to take the field. I believe there are suggestions that various brigades should be moved to various places round London, but the more you look into these the less is it possible to convince yourself that they have any very serious and practical meaning. The very first point that arises in examining these official schemes and the explanations given by those who introduce them, is that apparently the authorities have not settled the preliminary question, What is the Volunteer force which they are going to mobilize? I should like to read you one sentence by which the scheme, as far as I understand it to exist, was introduced in this theatre some years ago by General Brackenbury. He said, "Seeing before us so many Volunteer officers, I would ask them whether it is possible that the whole of any one of their Volunteer corps could be maintained in a garrison distant by rail an hour or two hours from the place where the men live. Could they be taken as a body of troops, put into a garrison, and the whole of them kept there during the continuance of a war which might last for many months? . . . . We consider that that is practically impossible, and the basis upon which our scheme has been worked has been this, that one-half of the Volunteers actually living in any seaport to be defended may be considered always available for garrison duty."[1] When these official tables were prepared, it would seem that the idea was to mobilize "every other" Volunteer, and I have once or twice asked Volunteers, "How do you suppose that every second volunteer is going to be mobilized?" That is the basis upon which the whole of the existing—I don't say mobilization scheme, but concentration—scheme for the Volunteers at present rests. I think that it is a very important point, and I have raised it here, because I am very anxious that some Volunteers with perhaps more recent experience than my own should explain, or that the authorities should explain, what is the meaning and bearing of this proposal to mobilize a fraction of the Volunteer Force. I bring that forward merely as an instance to show that the official arrangements which have as yet been made do not seriously consider anything that can properly be called the mobilization of the Volunteer Force.

Captain SICHEL, in reply, said: As Mr. Spenser Wilkinson suggested, this paper might, with advantage, have been cut in two. I have gone briefly over the possibilities of invasion, not with the wish of raising discussion on that subject to-day, but simply with the view of pointing out that, under certain circumstances, a surprise invasion may be possible. I may confess that I hardly believe such an invasion, if it were attempted, could take place with the suddenness I have endeavoured to depict. There is always a certain amount of leakage in such operations; news creeps out somehow in spite of the strictest censorship; and there are

[1] "R.U.S.I. Journal," vol. xxxi, p. 425.

always small mishaps, which cannot be calculated on, which would delay the mobilization of large bodies of troops. I have dealt with the movements of the invader on the assumption that he has been able to carry out his plans without a single hitch. But it is only fair to add that I have based my scheme for mobilizing the Volunteers in 24 hours on the same assumption. To introduce the element of luck would be to complicate matters needlessly. We may, I think, fairly assume that if there are leakages on the one side there will be leakages, too, on the other. Captain Foster asked me one or two questions relating to the first part of the paper and to the statement I made as to four army corps being fully mobilized in the north of France in the summer of 1882. This statement is not literally correct, as the corps in question had not their full complement of wagons and horses, but they were, to all intents and purposes, sufficiently fully mobilized to have been used for an expedition across the Channel. My authority for this statement is a brother officer of Captain Foster's, Captain F. N. Maude.[1] As regards the time required for disembarking troops, I have appended a foot-note to my paper showing the time we took to land men and guns, without the aid of steam launches, in the Crimea. Of course if the landing of a large force, say 100,000 men, were attempted in one place, it would naturally take a very considerable time. But by landing that force in divisions, at points along the coast within easy supporting distance of one another, the time occupied in landing four or five corps would not be any longer than the time occupied in landing a single division. We are rather apt to cast doubts on the power of other nations to convey troops by sea; to embark them or to land them; but I think the proper method of weighing this question should be by looking at what we have done and can do ourselves. We have landed troops and can land troops in a very short time without the aid of steam and in bad weather. Besides the Crimean experience there is the landing of Sir Ralph Abercromby in Egypt, which is a useful index of what can be done in the way of disembarking troops. I do not want to dwell too long on this part of the paper. I think it is too big a subject to be discussed now. Possibly at some future time it may serve some one else as the theme on which an interesting paper might be written. As regards the mobilization scheme for the Volunteers, I think everybody who has spoken has been good enough to back up what I said and to emphasize the point that all Volunteer brigades must be mobile. It is absolutely no use, as far as I can see, to have a so-called field army which is compelled to sit still behind intrenchments and watch an enemy marching to and fro in front, doing whatever he pleases. That is not mobilization; that is simply concentration. I shall be glad if any one will correct me if I am wrong, but that is the only official mobilization scheme of which I am cognizant. I think Colonel Cave has made a very excellent suggestion in advocating mixed divisions of Volunteers, Militia, and Regulars. You might possibly gather from my paper that I wanted to have the 100,000 Volunteers organized into three army corps by themselves. That was not my intention, as I agree entirely with Colonel Cave's views. I think it is absolutely essential that bodies of troops whose training is more or less imperfect should have a good stiffening of better trained troops. As regards the transport, it certainly is necessary that drivers should have practice in their work. Mr. Heath has pointed out that his battalion has its wagons and horses registered and can, at the present moment and at short notice, produce the requisite number of vehicles. The battalion in which I am serving was one of the ten selected in 1888 for the experiment of raising a loan transport train, and in that case we had absolutely no difficulty whatsoever, the Government grant of 45*l.* leaving us, I believe, a small margin of profit. That included taking the men and horses away from their work for either five or six days. I think if the transport were registered and called out on Saturday afternoons, or other holiday times, two or three times a year, it would be amply sufficient to make the men fairly good drivers. I have appended a note to my paper in which I suggest—and I hold this to be a matter of some importance—that when the transport is called out for practice, one wagon, at

[1] This statement was made some six or eight years ago in the pages of a Service magazine, and in a little pamphlet, "The Invasion of England." I have never seen it contradicted or impugned.—H. D. S.

least, should be fully loaded with the authorized stores. That should be done in order to test whether the mobilization arrangements are running smoothly. Mr. Arnold-Forster in his remarks thought the first point which everyone should lay stress upon was an absolutely invincible navy. In that I, and I believe everybody else, must agree with him. But we have to face facts as they are and not as they should be. I have simply dealt with the state of affairs which obtains to-day. Our navy is not yet strong enough, and we have, in consequence, to rely more or less on our land forces to complete our defensive armament; and this being the case I think that the subject of Volunteer mobilization is one which becomes a matter of national importance.

The CHAIRMAN (Colonel Gascoigne): Gentlemen, in conclusion, I should like to say that the lecture is a most excellent one; it has made me think on many subjects, and probably it has made most of you think. The question of mobilization is one to which we cannot give too much importance, and I was a little sorry to find that we drifted away from considering those details of mobilization which I think would have been more useful than the discussion of the question whether England was likely to be invaded or not. I do not know what view other gentlemen took, but it seemed to me that the question raised by the lecturer was, looking at the possibility of necessity arising for the sudden mobilization of the Volunteers, what was the best way of carrying that mobilization into effect. That was the point that I think he meant to convey to us, and I wish the discussion had gone more on the lines laid down by Major Balfour in dealing with questions of detail, instead of going into points which seem to be a little beyond us, as to whether there should be a larger fleet or not. One of the best suggestions was that thrown out by Major Balfour, about men's boots. It certainly is a point that I shall bear in mind myself, and I think that Volunteer officers will bear it in mind also. Certainly, in some corps in my brigade, I have noticed once or twice that the boots have not been what they should be—not as a rule, but there have been cases. That is a matter for ourselves to deal with. One gentleman spoke about the difficulties of the railway. I am in a very fortunate position, having the services of an excellent transport officer; but, certainly, for the few times that I have been out with our brigade, the railway authorities have met us in every way possible. I have been for two years with two brigades, numbering altogether about 8,000 men, and all the holiday people, and I can only say I was astonished at the way they worked without a single hitch of any sort or kind. Certainly the railways that I have had to deal with in the South of England are thoroughly able to cope with any sudden emergency that might arise. Then there was one other impression that I should like to remove from your minds. It struck me that there were one or two gentlemen who were inclined to take umbrage at the fact that the Volunteer brigades had certain places named for them to assemble at and so forth. I think it is necessary in every scheme that there should be some place of assembly, but it does not in the least follow, and certainly I can answer for my own brigade, that if ever such a thing happened as an invasion, one would wish them to stay at one place, for instance, Caterham, if there should be something going on elsewhere. The great thing is to have one place where we all know we can go to, and when we get there to be available to go anywhere and do anything, which I am perfectly sure from what I see of Volunteers they would be able to do. Also as regards the question raised about the Volunteers acting in reserve to the Regulars, in the event of invasion. I think there is one mistake about that. There are two elements of danger to England: one is war outside the country, the other is invasion. In the case of a sudden European war, every available Regular would be sent out, and the Volunteers would then form the garrison of England. In the case of the invasion of England, I do not anticipate for one single second that the Volunteers and Regulars would not fight side by side, each taking an equal part in the conflict. I have only, in conclusion, to ask you to tender your thanks to Captain Sichel for the very able lecture which he has given us. It has given me many subjects of thought which I shall try and work out with my brigade. All these things, therefore, do good. I am sure you will agree with that.

Mr. ARNOLD-FORSTER: As you seem, sir, to deprecate the introduction of any allusion to naval affairs, of which I am afraid I was guilty, I would venture to point

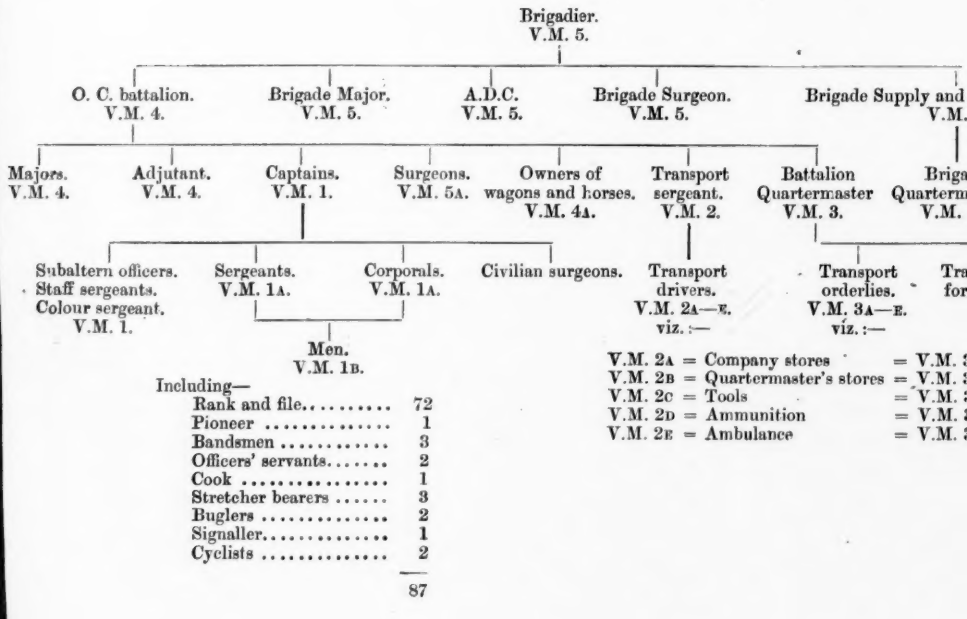
out that the equivalent of sixteen pages of this lecture is devoted to the discussion of the naval aspect of the matter.

Captain SICHEL: On occasions of this sort, the success of a paper is not owing so much to the merits of the reader as to the attention and intelligent appreciation with which it is followed by the audience. I think my best way of acknowledging your kind vote of thanks is, if you will allow me, to propose, second, and carry unanimously, a vote of thanks to all of you.

TABLE A.—*Showing Transport Train of a Mobilized Brigade (of 4 battalions).*

	Number of vehicles.	Purpose.	Description and carrying capacity.	Horses.	Drivers and sergeants.	Orderlies.	Stores.
For one battalion	4	Company stores	4-wheeled, lock under, covered wagons. To carry 30 cwt.	8	4	4	2 days' "iron rations," tools, books, and officers' baggage (*vide* Table B)
	1	Quartermaster's stores	Ditto.	2	1	1	Quartermaster's stores (*vide* Table C)
	2	S. A. A.	2-wheeled open carts. To carry 15—18 cwt.	2	2	2	30 rounds per man reserve ammunition (*vide* Table C)
	2	Tools.	Ditto.	2	2	2	Entrenching tools (*vide* Table C)
	1	Ambulance	4-wheeled, lock under, covered wagon. To carry 20 cwt.	2	1	1	Stretchers, "first aid" appliances, and medical stores
			Riding and spare..	4	2 sergeants'.		
Total...	10	..	..	20	12	10	
For 4 battalions	40	..	..	80	48	40	
Brigade staff	1	Brigade staff baggage	4-wheeled, lock under, covered wagon. To carry 30 cwt.	2	1	1	Baggage, books, maps, &c., of brigade Staff
			Lieutenant.....	1			
			Sergeant-major ..	1			
			Bugler.....	1			
41	41	..	..	85	49	41	

TABLE D.


Brigadier. V.M. 5.
O. C. battalion. V.M. 4.
Brigade Major. V.M. 5.
A.D.C. V.M. 5.
Brigade Surgeon. V.M. 5.
Brigade Supply and
V.M.
Majors. V.M. 4.
Adjutant. V.M. 4.
Captains. V.M. 1.
Surgeons. V.M. 5A.
Owners of wagons and horses. V.M. 4A.
Transport sergeant. V.M. 2.
Battalion Quartermaster V.M. 3.
Briga Quarterm V.M.
Subaltern officers. Staff sergeants. Colour sergeant. V.M. 1.
Sergeants. V.M. 1A.
Corporals. V.M. 1A.
Civilian surgeons.
Transport drivers. V.M. 2A—E. viz. :—
Transport orderlies. V.M. 3A—E. viz. :—
Tra for
Men. V.M. 1B.
V.M. 2A = Company stores = V.M. 3
V.M. 2B = Quartermaster's stores = V.M. 3
V.M. 2C = Tools = V.M. 3
V.M. 2D = Ammunition = V.M. 3
V.M. 2E = Ambulance = V.M. 3

Including—

Rank and file.....	72
Pioneer	1
Bandsmen	3
Officers' servants.....	2
Cook	1
Stretcher bearers	3
Buglers	2
Signaller.....	1
Cyclists	2
	87

TABLE B.—*Showing Details of Stores in Company Store Wagon.*

Stores.	Approximate weight of each article.	Total net weight.	Total gross weight.	Remarks.
	lbs.	lbs.	lbs.	
Tinned meat	..	400	560	Iron rations (two days).
Biscuits	..	400	500	
Flour	..	100	120	
Tea	..	20	25	
Sugar	..	50	60	
Salt	..	20	25	
Pepper	..	2	2	
Cheese	..	100		
Candles and matches	..	15		
15 zinc buckets (washing)	5	75		
4 lanterns	$1\frac{1}{4}$	5		
12 spades	$7\frac{1}{2}$	90		Tools for camp or bivouac purposes.
12 picks	$7\frac{1}{2}$	90		
12 axes	5	60		
20 tin openers	$\frac{1}{2}$	10		
8 officers' cooking utensils	8	65	As in second column.	
Rangoon oil	..	10		
1 fish kettle (officers' cooking)	8	8		
Books and stationery	..	30		
Materials for cleaning and repairing rifles	..	50		
Officers' baggage (6 company officers)	40	240		
Do. (2 mounted „)	80	160		
2 ropes (picketing) 25 yds. each	..	50		
3 days' forage for two horses— 12 lb. oats, 12 lb. hay } per diem per horse	25	150		
Total	..	2200	2500	

TABLE C.

QUARTERMASTER'S STORES.

Stores.	Weight.
	lbs.
Stationery	100
Butcher's tools	20
20 lanterns	25
Soap	100
Carpenter's tools	20
Shoemaker's do.	30
Smith's do.	100
1 lifting jack	30
12 fish kettles, at $8\frac{1}{2}$ lbs.	100
Oil, grease, and dubbing	100
Boots (100 pairs, at $3\frac{1}{2}$ lbs.)	350
100 blankets, at $4\frac{1}{2}$ lbs.	450
Sugar and limejuice	50
Socks (100 pairs, at 4 oz.)	25
Ropes, tow, &c.	100
16 zinc buckets, at 3 lbs.	50
16 spades, at $7\frac{1}{2}$ lbs.	120
16 picks, at $7\frac{1}{2}$ lbs.	120
16 axes, at 5 lbs.	80
20 tin openers, at $\frac{1}{2}$ lbs.	10
Picketing ropes and forage	200
Tobacco, matches, candles, cord, dubbing, brushes, &c. &c.	100
Total	2,280

S.A.A. CARTS (2).

800 men, at 30 rounds per man = 24,000 rounds.

Boxes.	Rounds per box.	Weight per box.	Total Weight.
			lbs.
40	600	80 lbs.	3,200
		forage, &c.	200
		Total	3,400

TOOL CARTS (2).

Stores.	Weight of each article.	Total Weight.
	lbs.	lbs.
(1) 120 picks	$7\frac{1}{2}$	900
120 shovels	$7\frac{1}{2}$	900
4 felling axes	5	20
4 hand axes	2	10
25 billhooks	2	50
4 crowbars	25	100
2 sharpening stones	$2\frac{1}{2}$	5
Forage, &c.	..	200
Total		2,185

(1) 75 men per company (*i.e.*, rank and file 72, officers' servants 2, cooks 1), *vide* Table D = 600 men per battalion. 20 per cent. provided with tools.

VOLUNTEER

V.M. 1.

INSTRUCTIONS FOR COMPANY OFFICERS.

Battalion Assembly Post _____ *Company Station* _____

Company Assembly Post _____

Order to Mobilize.—The O.C. the company will receive the following written or telegraphic order:—

To Captain _____

_____

MOBILIZE.

From Colonel _____

_____

He will at once acknowledge receipt to the sender by messenger or telegraph stating date and hour he received the order. Copies of this order will be immediately despatched by the quickest available means to—

Lieutenants

_____

_____

who will act as instructed in this V.M. form.

Staff and Colour Sergeants

_____

_____

who, after complying with the requirements of V.M. Form 1B, will act as instructed below.

Sergeants

_____

_____

_____

_____

Corporals

_____

_____

_____

_____

who will act as directed in V.M. 1A.

Civilian Surgeons

_____

_____

Dress.—Full marching order—water-bottle filled and greatcoat rolled. Haversack to contain one day's cold rations (say 1 lb. meat, 1½ lbs. bread, pepper, salt, &c.), with knife, fork, and spoon.

Baggage.—Each company officer is allowed 40 lbs. of baggage, which should include the following:—

	lbs.
1 blanket	6
1 pair trousers	2½
1 undress jacket and cap	4
1 pair shooting boots and 6 spare laces	3
2 pairs worsted socks	½
1 pair drawers and 1 flannel shirt	1½
2 handkerchiefs and 1 soft cap	½
2 towels	1
1 holdall, containing comb, hair-brush, scissors, metal soap box	2
1 sponge in bag and 1 housewife	½
1 tin of dubbing and 1 tin match box	¼
1 writing portfolio (pens, ink, paper)	1
1 journal book	¼
1 cholera belt and 1 linen bandage	½
1 candle lamp and candles	1
1 india-rubber basin	1
1 "Soldier's Pocket-book"	1
Sundries	4
The whole contained in a waterproof valise, forming a bed, and weighing	9
	40

Assembly.—All company officers will be at their respective company assembly posts within two hours after being warned. Their baggage will, if possible, accompany them. In any case it must reach the company assembly post within three hours.

The company officers will exercise a general supervision over the assembling of the men, assisted by the staff and colour sergeants. One or more sentries should be posted to keep off unauthorized persons from the company assembly post.

When the company is mobilized the O.C. the battalion will be notified.

Company commanders will be responsible that forms V.M. 1, 1A, and 1B are in the hands of all concerned, and that they are kept up to date. All sergeants, corporals, transport drivers, and orderlies, as well as Lieutenants and staff and colour sergeants, should be provided with copies of V.M. 1B, in addition to those V.M. forms which lay down their respective duties on mobilization.

In the case of an outlying company, local arrangements will be made for conveying the officers' baggage, company books, &c., from the home station of the company to the battalion assembly post.

Men detailed for Special Duties.—A nominal roll of all officers' servants, cyclists, stretcher-bearers, signallers, transport-men, pioneers, bandsmen, cooks, and buglers will be appended to this form.

V.M. 1A.

INSTRUCTIONS FOR SUBSECTION LEADERS.

*Company Assembly Post*_____

Order to Mobilize.—You will receive either a written or telegraphic message as follows:—

To_____

_____

MOBILIZE.

From Captain_____

_____

You will at once send a written or telegraphic receipt to your company commander thus:—

To_____

_____

ORDER TO MOBILIZE RECEIVED.

Signed_____

Date_____ Hour_____

After which you will warn, *personally if possible*, and leave with every man of your squad a copy of V.M. 1. In performing this duty you may make use of the most rapid means of conveyance, cabs, tramways, railways or horses, telegraphs or telephones. Your expenses will be refunded when the company is mobilized.

You will get a written receipt from every man with whom you leave a copy of V.M. 1. Thus—

Received from_____

1 copy of V.M. 1.

Signed_____

Date_____ Hour_____

After all the men of your squad have been warned, you will proceed to your own home and yourself comply with the instructions contained in V.M. 1.

Assembly.—Immediately you have done this you will go to the company assembly post, where you will muster your squad and see that every man has complied with the instructions in V.M. 1.

You will report to your company commander when your squad is complete.

N.B.—A copy of this V.M. form, duly filled up, together with his squad book, should be in the possession of every subsection leader.

V.M. 1B.

INSTRUCTIONS FOR THE RANK AND FILE.

URGENT.

The battalion has received the order to mobilize. Every man will proceed *at once* to the company assembly post at _____

Dress.—Full dress, with leggings, water-bottle, haversack, valise, greatcoat, and both pouches.

Water-bottles to be filled with cold tea, water, or spirits and water.

Haversacks will be worn over the right shoulder. Every man must fill his haversack, before leaving home, with one day's cold rations, for consumption on the day of mobilization, viz., 1½ lb. meat, 1½ lb. bread, and a small quantity of salt. A knife, fork, and spoon will also be carried in the haversack.

Valises should contain—

1 undress serge jacket.
1 pair boots.
1 pair socks.
1 flannel shirt.
1 small sponge.
1 holdall (containing razor, button cleaner, and shaving brush).
1 tin of dubbing.
Boot brushes.
1 hairbrush and comb.
1 towel and 1 piece of soap.
1 linen bandage (3 in. wide and 3 ft. long).
1 housewife (containing scissors, pins, needles, buttons, thread, &c.).
1 cape for the greatcoat.
1 Glengarry cap.

Sundries.—Every man should carry on his person 1 pocket-knife, 2 yards of cord or stout string, matches, and (if he smokes) a pipe and tobacco.

Assembly.—On arriving at the company assembly post, every man will report himself to the N.C.O. commanding his squad.

N.B.—A sufficient supply of these V.M. forms should be kept at each company or battalion headquarters, together with blank receipt forms for the same.

V.M. 2.

INSTRUCTIONS FOR THE TRANSPORT SERGEANT.

Battalion Assembly Post _____

Order to Mobilize.—The transport sergeant will receive the following written or telegraphic order :—

To _____

_____

MOBILIZE.

From _____

_____

He will at once acknowledge receipt to the sender, stating date and hour he received the order.

Copies of the order will be immediately transmitted by the quickest available means to the transport drivers of the following wagons, who will have in their possession and will act according to the V.M. forms opposite their names :—

Company Stores Wagons, V.M. 2A _____

_____

_____

_____

Quartermaster's Stores Wagon, V.M. 2B _____

Tool Carts, V.M. 2C (1) _____ (2) _____

_____ _____

Ammunition Carts, V.M. 2D (1) _____ (2) _____

_____ _____

Ambulance Wagon, V.M. 2E _____

_____

Dress.—Full dress, *i.e.*, tunic, helmet, pantaloons, knee-boots, and sword. Havresack containing one day's cold rations, knife, fork, and spoon. Valise or kit bag to contain the articles enumerated on V.M. 1B. Water-bottle to be filled. The valise or kit bag will on arrival at the battalion assembly post be placed in the wagon of that company to which the transport sergeant is attached.

Horse.—Harness and accoutrements complete. To be fed and watered before starting. 12 lbs. oats and 12 lbs. hay to be carried in corn bags and hay nets.

Assembly.—The transport sergeant will, on arriving at the battalion assembly post, exercise a general supervision over the transport train. He will be responsible that it is complete in men, horses, and wagons, and that it takes ground at the place and in the order indicated in the standing orders of the battalion. A copy of Table A should be in the hands of every transport sergeant.

_____

INSTRUCTIONS FOR TRANSPORT DRIVERS.

Company Stores Wagons.

*Battalion Assembly Post*_____

Order to Mobilize.—You will receive either a written or telegraphic message as follows:—

To_____

_____

Mobilize.

From sergeant _____

_____

You will at once send a written or telegraphic reply to the sender thus:—

To sergeant_____

_____

Order to Mobilize Received.

Signed_____

Date_____ Hour_____

After which you will comply with the requirements in V.M. 1, except that in place of proceeding to the company assembly post you will go to

Wagons. _____

_____

where you will find_____wagon waiting for you. Leave your valise and rifle in the wagon and proceed to

Horses. _____

_____

where you will find_____horse which must be fed and watered before starting.

Harness.—Harness to be complete on each horse. Nose-bag, halter, and horse-blanket for each horse, to be packed on or under driver's seat.

Collection of Supplies.—Harness the horses to the wagon and drive to

Firstly,_____

_____

where you will pick up and pack in the wagon—

400 lbs. plain biscuits.	100 lbs. cheese.
400 „ tinned meat.	20 „ tea.
100 „ flour.	50 „ sugar.
2 „ pepper.	15 „ candles.
20 „ salt.	20 tin match boxes.

Secondly,_____

_____for

15 zinc buckets.	12 spades.
4 candle lanterns.	12 picks.
20 tin openers.	12 axes.

Eight officers' cooking utensils, consisting of:—

1 frying pan.	2 teapots (metal).
1 kettle.	1 iron fork and spoon.
1 large saucepan.	1 butcher's knife.
1 large sized fish kettle with cover (to cook 12 rations)	8 metal cups.
	12 metal plates.

Thirdly,_____

For 50 yds. 2-in. rope.

Fourthly,_____

_____

For 75 lbs. oats and 75 lbs. hay, which must be packed in corn bags and hay nets, and slung on the outside of the wagon or underneath it.

Fifthly.—The battalion assembly post, where the company stores and officers' luggage will be packed.

Assembly.—When the wagon is loaded it will take ground in _____

opposite _____horses' heads

towards_____

_____

V.M. 3A.

INSTRUCTIONS FOR TRANSPORT ORDERLIES-COMPANY STORE WAGONS.

*Battalion Assembly Post*_____

Order to Mobilize.—You will receive either a written or telegraphic message as follows:—

To_____

_____

MOBILIZE.

From Quartermaster_____

_____

You will at once send a written or telegraphic reply to the sender thus:—

To Quartermaster_____

_____

ORDER TO MOBILIZE RECEIVED.

Signed_____

Date_____ Hour_____

After which you will comply with the requirements in V.M. 1.

On arriving at the battalion assembly post you will leave your valise, rifle, &c., and proceed to

Collection of Supplies.

Firstly, _____

_____ for

400 lbs. plain biscuit.	20 lbs. salt.
400 „ tinned meat.	20 „ tea.
100 „ flour.	50 „ sugar.
100 „ cheese.	15 „ candles.
2 „ pepper.	20 tin match boxes.

Secondly, _____

15 zinc buckets.	12 picks.
4 candle lanterns.	12 axes.
12 spades.	20 tin openers.

Officers' cooking utensils, consisting of:—

1 frying pan.	1 butcher's knife.
1 large saucepan.	2 metal teapots.
1 kettle.	8 metal cups.
1 iron fork and spoon.	12 metal plates.

1 large size fish-kettle with cover (to cook 12 rations).

Thirdly, to_____

_____

For 50 yards 2-inch rope.

Fourthly, to _____

_____

75 lbs. oats and 75 lbs. hay, which must be packed in hay nets and corn bags.

Fifthly, to the armoury, where you will pack the following company stores in a small hamper or box:—

1 can Rangoon oil.
1 Infantry Drill.
All company books and papers.
Materials for cleaning and repairing rifles.
1 lb. tow.
1 lb. clean rags.

Company transport orderlies will be careful to see that all these stores are placed outside the shop or armoury doors, so that they may be easily packed when called for by the transport drivers. After seeing this done, the orderlies will return to the battalion assembly post, where they will report themselves to, and receive any further instructions from, the Quartermaster.

FOREIGN SECTION.

THE BATTLE-SHIPS OF ENGLAND.

Extracts from an article in the "Revue Maritime et Coloniale" for April, 1893, by PROSPER SIMON, Lieut. de Vaisseau.

(*Continued from Number* 183.)

IN his former article under the above heading, published in the January number of the "Revue," and of which we published extracts in the R.U.S.I. Journal for May, the author dealt with the ships forming our first line of defence, and endeavoured to show by what succession of ideas we arrived from type to type from the "Devastation" to the "Royal Sovereign"; in the present article he deals with our cruisers, and says: "We shall see if the English have profited, with similar judgment, by the lessons which are presented in the study of the successive types. The 'Iris' and 'Mercury,' launched respectively in 1877 and 1878, were designed as scouts to accompany a squadron, or, according to the report rendered to the House of Commons, to be able, if the necessity should arise, to play a similar part to that enacted by the famous 'Alabama.' They have served as prototypes of all the English cruisers, and we shall see, in fact, that many years afterwards in the 'Leander' and 'Mersey' types, absolutely the same dimensions are preserved. Designed for 18 knots, they are said to have made 18·57 and 18·88 respectively, but their captains have complained that they are too short to steam fast against the sea, and too fine forward for their length, causing them to ship too much water. Let us remember this complaint of the Commanders of the 'Iris' and 'Mercury' in 1878, and we shall see if the English constructors have taken account of this in the preparation of later designs. During the four years following the commencement of the 'Iris,' the English built the two cruisers 'Bacchante' and 'Euryalus,' of 4,200[1] tons and 15 knots; nine cruisers of the 'Comus' class, of 2,400 tons and 13 knots; and three of the 'Tourmaline' type, of 2,150 and 12¾ knots. We have launched during the same period the 'Duquesne' and 'Tourville,' 5,520 tons and 16¾ knots; the 'Éclaireur' and 'Rigault-de-Genouilly,' 1,650 tons and 14¾ knots; the 'Duguay Trouin,' 2,230 tons and 16 knots; and five of the eight cruisers of the 'Lapérouse' type, 2,260 tons and 14½ knots; so that if we consider

[1] All displacements in this article are given in French tons.

the cruisers launched or in process of construction during this period of four years by England and France, we see that the former possessed, in 1880, 17 cruisers with a total displacement of 46,000 tons, steaming, excluding the 'Iris' and 'Mercury,' 12½ to 15 knots, whilst the latter figures with 13 ships with a total displacement of 36,000 tons, and steaming 14·2 to 17 knots. This comparison caused the English to reflect: they found that we were running them very closely; if they had numbers we had the speed, and the spectre was raised in the House of Commons of French cruisers preying on British commerce, with the result that the Admiralty prepared the plans for fast cruisers of the modified 'Iris' type, which were ordered by contract, and formed the next class, 'Leander,' 'Amphion,' 'Arethusa,' and 'Phaeton,' of partially protected 2nd class cruisers. Their most prominent characteristic is their large coal supply, 1,000 tons, which gives them a range of 11,000 miles at 10 knots, but their normal stowage corresponding to their designed displacement is 750 tons. They each carry on the spar-deck a torpedo-boat of 12 tons, of which one does not well see the utility. A torpedo-boat can render great service it is very certain, but above all things incongruity is to be avoided in naval service, and a torpedo-boat does not appear to be much more in place on board the 'Leander,' than a 4-in. gun would be on the 'Bombe.' These four cruisers have an estimated speed of 17 knots, but with all their coal and weights on board, they have a heavy over-charge of about 550 tons, and cannot attain their speed until this has been reduced; they are the only cruisers in the English navy carrying their bow and stern chasers under cover on the upper deck, but in spite of this favourable disposition of their artillery they are very deficient in stability, pitching and rolling most abnormally, with very sharp recovery.

"The first step was taken, but the Admiralty considered that more should be accomplished. These cruisers were only partially protected; the armoured deck, 1½ in. thick, only protecting the engines and boilers, &c., or 54 per cent. of their total length, whilst it was desired to formulate the principles and qualities of a cruiser suitable for distant stations, and which could engage fast protected or ironclad cruisers; *read*, our cruisers of the 'Duguesclin' type which we had in hand at this time. It was laid down as necessary to this end: a speed of 16 knots, a certain number of guns capable of piercing the thickest armour carried by battleships of the 2nd class then known, a protection of the vital parts at least equal to that of these ironclads, a large coal supply, and auxiliary sail power which would permit of its being economized. It was thought that this type had been found in the following: 96 metres long, 18·60 metres beam, a displacement of 7,500 tons, with engines of 8,000 I.H.P., a normal coal supply of 400 tons, which could be raised to 900 tons, four 9-in. 18-ton guns, a partial belt 8 in. thick, with a complete protective deck. It was decided to build two ships of this type, and in 1881 orders were given to Portsmouth and Chatham for the 'Impérieuse' and 'Warspite.'" After enumerating all the details of the modifications carried out in these designs, and the severe

criticism to which they and their designers were subjected in the public press and elsewhere on account of their excess of displacement, &c., the author concludes by saying: "The moral effect of this history of the 'Impérieuse' and 'Warspite' was the solemn declaration of the Board of Admiralty that they would obstinately resist in future every proposition which would have as a result any addition to the weight of any ship under construction. This did not prevent them, however, from sending, two years afterwards, two new guns of 6 in. calibre to each of these cruisers. The English have found that with the disposition of the artillery adopted in these ships, the guns of the auxiliary armament were interfered with by those of the barbettes, and have decided not to borrow an idea of this kind from us again. For them the position of the heavy guns can only be forward and aft, the auxiliary armament being between them, and this is the arrangement in all their ironclads, which if suitable for battleships, cannot be so for a cruiser. To load the bow of a cruiser with artillery and so prevent her from rising to the sea is 'nonsense.'"

On the "Mersey," "Forth," "Severn," and "Thames" class, the author remarks: "The 'Mersey,' first of the type, was laid down in 1883, five years after the 'Iris,' but like the 'Leander' has the same dimensions as that cruiser, no notice having been taken of her captain's complaint that she was too short to steam against a sea; on the contrary, the 'Mersey' was given 8-in. bow and stern chasers weighing 15 tons, whence the following dilemma: whether to give these cruisers fine lines in order to cleave the water with a head sea, when the great weight forward for the displacement would cause them to ship sea after sea and so prevent them from chasing, or in order to give a good gun platform and solidity forward to give them full lines, which would be very unfavourable to the high speeds which are required of this class of ships, and which we shall see as a fact the English ships have great difficulty in attaining, even when the full estimated power has been developed. The artillery of the 'Mersey' is completed by ten 6-in. guns, the total armament of the 'Leander' class; these have, it is true, two torpedo-boats of 12 tons on deck, but they are in the centre of the ship, and in the 'Mersey' class it is less the weights themselves than the arrangement of them which is so unsatisfactory. On trial they have made 17 knots under natural, and 18 knots with forced draught, with the exception of the 'Forth,' which made 16 knots and 17·3 respectively; but these speeds have been attained, the one on the measured mile, the other by patent log, with displacement inferior to that of their design, and it is to be noted that these cruisers when fully armed have an excess in displacement of 500 tons, which gives them an actual displacement of 4,100 tons. Their captains have very naturally complained of the 8-in. guns, and asked that they might be replaced by lighter ones, and their remarks have received the support of the committee for the manœuvres of 1888.

"'Scout' and 'Fearless,' 3rd class cruisers. At this period we were pushing on with the construction of our cruisers and torpedo catchers, and the English were inspired by our 'Condor' to design the above

two squadron scouts; these two ships are auxiliaries rather than cruisers, but they have, however, their place in this study as having given birth to the 'Archer' and 'Barracouta' class.

"'Condor': length, 68/beam, 8·90 = 7·6. 'Scout': 67/10·45 = 6·4. Mean draught: 'Condor,' 4·25 m.; 'Scout,' 4·00. Displacement, actual: 'Condor,' 1,240 tons; 'Scout,' 1,600. Guns: 'Condor,' five 10-cm. (4-in.); 'Scout,' four 4·7-in.; 'Condor,' five torpedo-tubes; 'Scout,' seven. Speed: 'Condor,' at 3,580 tons, 17·8 knots; 'Scout,' 3,200 tons, 17 knots. Coals: 'Condor,' 115 tons; 'Scout,' 450 tons. This comparison shows clearly the difference in the two systems of construction; the speeds, however, are not very different, although the 'Scout' developed less power than the 'Condor,' but here, again, it is necessary to add a note of interrogation. We see that the 'Scout' has a large coal supply, which accounts for the large excess of displacement over the design—1,600 to 1,280 = 320 tons; the normal coal supply is 300 tons. A large supply of coal is certainly an important factor of power for all ships, but it loses its value for scouts, which are always attached to a squadron; what is necessary above all is speed, and how will the 'Scout' steam with her 450 tons on board?

"The 'Archer,' 'Brisk,' 'Cossack,' 'Mohawk,' 'Porpoise,' 'Racoon,' 'Serpent,' and 'Tartar' are modifications of the 'Scout' class, with the same length but more beam; the proportion, already reduced from that of the 'Mersey' in the 'Scout,' falls in this class to 6·2. Our ships are too short, is the cry of the English captains, and they carry too much of their armament forward. One can scarcely realize the weight that these unfortunate ships are obliged to carry forward 'in the eyes of the ship':—

	Tons.
Two 6-in. guns weighing with their mountings	26·0
Two bower and one reserve anchor.....	6·0
Anchor gear and fittings	2·5
	34·5

"These ships, which carry 475 tons of coal, have a displacement with all their weights on board of 1,800 tons; but the 'Porpoise,' when fitted out for China, was found to be at her normal draught with her bunkers nearly empty, and the 17·6 knots which she attained on her trials fell subsequently to 15·7 knots. Her engine-rooms are too cramped, on account of the position of her protective deck, which does not reach the water line at any point, and work below is most painful at high speeds.

"The 'Orlando,' 'Aurora,' 'Australia,' 'Galatea,' 'Immortalité,' 'Narcissus,' and 'Undaunted,' the belted cruiser class, are 'Merseys' with an armour belt, their length the same as this cruiser, and which was condemned as too short seven years before. The length being fixed, in order to carry the increased armament and armour protection it was necessary to increase the draught and beam, the proportion of length to beam again falling in this case from 6·5 to

5·3; this persistence in maintaining a constant length of 91·5 m. is inexplicable; the beam, 17 m., is very reasonable for ships of this class with an armour belt, heavy armament, and engines of the same power as the 'Impérieuse,' and a new departure should have been made from this ship; keeping the proportion of L/B = 6·5, and giving this type of cruiser a length of 105 to 100 m., would have enabled them to steam against a heavy sea, a quality which is now wanting in them. On the official trials we shall see that these ships attained a very good speed—17½ knots under natural and 19 knots under forced draught—with the designed draught and displacement, but like the 'Impérieuse,' and in spite of the solemn engagement of the Admiralty of that period to oppose energetically all alterations in ships under construction, the cruisers of the 'Orlando' type have been found to have an excess weight of 500 tons when fully armed, which gives them an increased draught of 18 in.; this is always after their steam trials. As in the case of the 'Impérieuse,' the question was brought before the House of Commons, and the same history recommences. Since in the manœuvres of 1889 the 'Immortalité' could not maintain a higher speed than 15 knots for a course of 200 miles, we may take this as their maximum speed. We again find the heavy bow and stern guns, this time 9-in. guns, which are much too heavy for a cruiser of 5,000 tons, armoured or not, if she is to be a fast ship.

"On account of the extent to which the division of these ships into compartments has been carried, great difficulty has been found in working the coals, and alterations have had to be made throughout the ship to remedy this defect. Considerable discussion took place in the House on the submersion of the armour belt through the excess weights. Sir Arthur Hood and Mr. White did their best to prove that none of the advantages of the design were lost, as, even with the belt submerged, they were still in the position of the protective-deck cruiser. This is not quite correct, as the level of the protective deck is generally above the water line; but if the position of the armour belt is so unimportant, it would have been simpler to leave it out altogether, which would have been a great saving both in weight and money."

The "Medea," "Medusa," "Magicienne," "Marathon," and "Melpomene" are subjected to a criticism almost identical with the foregoing on the protective cruiser and belted-cruiser classes, and the author appears to conclude that our method of construction chiefly results in a combination of all the defects of preceding types; we will, therefore, pass on to his criticism of the "Blake" and "Blenheim." "These have been given the name of 'Sea Greyhounds,' on account of the high speed which they are supposed to possess—22 knots under forced, and 20 knots under natural draught—the latter speed to be regularly maintained at sea. Their great length, it was supposed, would enable them to do this easily, but, unfortunately, these cruisers have not given very brilliant promises on their trials. The 'Blake,' by reason of the weakness of her boilers, only developed 14,525 I.H.P., with a speed of 19·12 knots. This failure caused great excitement, as the fond hopes which had been founded on these

cruisers were seen to be illusory. In fact, besides the weakness of the boilers, the results as regards speed were extremely disappointing, as, instead of 20 knots which the 'Blake' should have attained with 13,000 I.H.P., only 19·12 knots were obtained with 14,525 I.H.P. It was given as an explanation of this result that the trials took place in too shallow water, and the argument was supported by the recent trials of the 'Latona' and 'Terpsichore,' the first in the Clyde, the second in the deep water of the Solent, with a gain of $\frac{1}{2}$ knot; but this is, indeed, to 'look for noon at 2.0 P.M.' The fact is, that the calculated coefficient has not been realized. Is not the failure due to defective lines? It is true that the 'Blake' has been given great length, but, at the same time, her beam has been made almost equal to that of the ironclads, and, whilst we give to the 'Tage' and 'Dupuy-de-Lôme (the latter armoured from end to end) a proportion of length to beam of 7·2, in England this proportion is allowed to fall to 5·7. Her artillery is not to blame, it is absolutely that of the 'Orlando,' and, apart from the difference of calibre of the heavy guns, that of the 'Mersey,' of which the 'Blake' is an enlarged copy. Must we, then, look for the reason in the large coal supply, 1,500 tons, or are we simply in the presence of a system? The tradition seems to be in England that their ships should be relatively short, and this is certainly a gain in evolutionary power; but, for a cruiser of 9,000 tons, *la première raison d'être* is speed; and it is for the 'Blake' a vital question, as the capability of steaming 20 knots is one of the characteristics of the programme. The 'Blenheim' has proved little less unfortunate than her sister; the boilers are to be changed, the type is condemned; our neighbours throw the weight of their discontent on the engineers who have designed the engines and the hull, and they are not, perhaps, wrong as regards the hull."

Our critic has not much that is new to say of the "Barracouta," "Barrosa," "Blanche," and "Blonde"; he fails to see where the progress is from the "Scout," and states that, by reason of boiler troubles, the speed of these ships may be reckoned as $14\frac{1}{2}$ knots as a maximum. As regards the "Barham" and "Bellona," he says, "They were laid down in 1888, as a reply to our 'Forbin' type, which they resemble in displacement, power, and estimated speed, but they have not the same lines. The English have made a grand effort in bringing the proportion of length to beam up to 8, but they have not dared to give them the same fineness of form as our own, 95 m. to 9·5 m. Unfortunately they have not been able to take account of this good feature in their construction by reason of leaks in the boilers, which were so serious in the 'Barham' that she was obliged to anchor and await the assistance of a tug; but in default of results attained by themselves, our neighbours can judge by the splendid speed of the 'Forbin' class, what this fineness of form permits us to realize when the estimated power can be developed, viz., 'Forbin' 20·63 knots, 'Cosmao' 20·60, 'Lalande' 20·89, 'Surcouf' 20·51, 'Troude' 20·94."

On the "Pallas," "Pearl," "Philomel," and "Phœbe," our author remarks: "These cruisers are too short, and they would probably have

been made longer if their construction had been delayed a few months, or even a few weeks, as the 'Medea' had just commenced her trials at the moment that this type was commenced. The 'Pallas' and her sisters have attained 19 knots, but not always without difficulty; the 'Phœbe' had to stop her trial last year, after three hours, on account of boiler leaks, four men being badly injured. The 'Pallas' has shown good qualities in bad weather, and it is always reassuring to know that a ship is a good sea boat; but can she steam fast against a sea? We may say, no, since she is the 'Medea,' and therefore of a type which is defective."

"'Edgar,' 'Endymion,' 'Grafton,' 'Hawke,' 'Theseus,' 'Crescent,' 'Gibraltar,' 'Royal Arthur,' 'St. George.' These were laid down in 1889, in consequence of the Naval Defence Act, and are in opposition to our large cruisers, 'Cécille' and 'Tage,' which they exceed by 400 tons; they are reductions from the 'Blake,' and, consequently, modifications of the 'Mersey.' We come back then to cruisers with heavy bow and stern chasers; not like the 'Tage,' with her fine lines forward cleaving the water at high speed, and to which it would have been necessary to give full lines instead of the finest possible, had she been encumbered with a 9-in. bow chaser; but our neighbours are obstinate. To fight against cruisers there is, moreover, no need of heavy battering guns, but light guns, capable of rapid movement and with flat trajectory, are most required. The battery armament, apart from the question of rapid fire, is the same in the two ships, but the eight 6-in. guns of the 'Tage' are preferable to the two 9-in. guns of the 'Edgar.' The English have decided to replace the 22-ton gun forward by two 6-in. guns, weighing altogether 10 tons, in those cruisers destined for distant stations; do they begin to admit, that a ship heavily armed forward does not merit the name of cruiser? This change, however, will not correct the full bow lines, of which the former heavy guns were the cause. These cruisers are too broad for their length, and the proportion should have been 7·2, since they are due to the inspiration of the 'Tage.'

"An interesting peculiarity of this class is the good protection of the guns and engines, the latter, where they rise above the protective deck, by a steel dome 6 ins. thick. The estimated speed with 12,000 I.H.P. is 19·75 knots, 19½ knots for the sheathed ships; the 'Edgar' had very successful trials, realizing 20 knots with 12,460 I.H.P., and a maximum of nearly 21 knots with 13,100 I.H.P., which appears rather improbable, for at such speeds it is not with 500 I.H.P. that an extra knot is gained.

"'Apollo,' 'Andromache,' 'Latona,' 'Melampus,' 'Naiad,' 'Sappho,' 'Scylla,' 'Sybille,' 'Terpsichore,' 'Thetis,' 'Tribune,' 'Æolus,' 'Brilliant,' 'Indefatigable,' 'Intrepid,' 'Iphigenia,' 'Pique,' 'Rainbow,' 'Retribution,' 'Sirius,' 'Spartan,' 'Astrea,' 'Bonaventure,' 'Cambrian,' 'Charybdis,' 'Flora,' 'Forte,' 'Fox,' 'Hermione.' 2nd class protected cruisers.—These were constructed under the provisions of the Naval Defence Act, and the whole 29 were intended at first to form one class, but as it was

thought that too much had been expected of them, viz., the power and speed of the 'Medea,' from which they are derived, eight of them have been built with increased dimensions; the power of the engines remaining the same, the speed is reduced from 20 to 19½ knots; these are known as the 'Astrea' class. The sides have been raised and a spar deck constructed, on which the guns have been mounted, so that these ships in profile have exactly the appearance of the 'Edgar.' They will certainly be fine sea boats, but unfortunately they have not been made long enough, the proportion again falling to 6·4, a figure dear to our neighbours. We remark the good disposition of their armament; they have a single 6-in. gun forward and aft, an unique example in English cruisers of light bow and stern chase guns; this has allowed of the 'Apollo' class being designed with finer lines, and beam slightly less in proportion to length; as to the latter, it was fixed in advance; it is that of the 'Iris,' 'Leander,' 'Mersey,' and 'Orlando'—91·5 metres, a fatal figure. Many of the ships have already completed their trials, for the programme of construction of 1889 has been carried out with marvellous rapidity. The results are satisfactory, although the expected speed has hardly been attained with the estimated power, but the engines have developed higher powers than those contracted for, and the boilers are satisfactory. The leaks formerly so frequent have ceased, and, strange to say, this has been attributed to the double ended boilers, a type which later, in the 'Blake' and 'Blenheim,' has given such unsatisfactory results. The programme of 1889 has so far advanced that the English have commenced to consider new designs for ships to replace those which have attained, like human beings, their limit of age. Will they build new cruisers? If so, will these ships mark a progress, or will they also bear the mark of this spirit of recoil which has been manifested in the creation of so many of their types? for we must say of our neighbours that they have failed to extract from the study of their numerous cruisers all the teaching which they are capable of imparting."

T. J. H.

A FOREIGN NOTICE OF MR. WILLIAMS' "THE STEAM NAVY OF ENGLAND."

In the "Rivista Marittima" for April is a rather lengthy and appreciative notice of Mr. Harry Williams' book, "The Steam Navy of England, Past, Present, and Future." In the course of his remarks, the reviewer, S. Raineri, says, "We will say at once that the first thing which strikes the studious Italian is the liberty of opinion, of which the author makes such large use; and we note this because in Continental navies there is such a spirit of conservatism and exaggerated sentiment of discipline as sometimes renders the expression of ideas and opinions impossible, which, if given in time, might have prevented considerable injury, and saved the susceptibilities of those concerned. To this general reserve it is due that the public has such a slight acquaintance with naval matters and with the complex mechanism of which the navy is composed." On the subject of training seamen and stokers into all-round men, he says: "The author replies to all the doubts which can be raised against his thesis, but the Italian reader must continually bear in mind that the greater number of the English stokers serve in the navy for a period of 22 years. Is it the same with us? Here the military career of the seaman or stoker is considered by the common people more as a penance than as a noble part in life, and the first thought of the conscript as he dons his uniform is to sigh for the day when he will be able to lay it aside for good. On the other hand, the short service system and the present system of conscription make the training of the personnel to the various duties of life on board ship impossible, and this training must be confined to one kind of work only—either deck, artillery, or engine-room duties. *A priori*, a system such as is desired by the Chief Inspector of Machinery for the English navy would not seem to be applicable to ours; but is the Italian system more suitable for us in these later times? First of all, the number of stokers, and, for that matter, of seamen also, is insufficient, if for stokers and seamen we understand really able-bodied men, and not the number of untrained youths included amongst the 215,000 individuals inscribed as men in our navy. At 20 years of age the necessary fibre has not been acquired for sustained hard work, besides which, good stokers, that is, able-bodied men who have been tried in their work, prefer to pass their lives on board merchant ships, since their services would not be accepted on board a man-of-war, and the same may be said of the seamen. A reform would therefore appear necessary with us, and it should consist—

"1st. In making possible the creation of a military career, properly so called, for seamen and stokers, so that they may be led to prefer, both for moral and material reasons, the service of the State to that of the mercantile marine, and to become attached to their professions.

"2nd. In organizing the crew of a man-of-war so that it may satisfactorily meet all requirements, both from the point of view of seamanship and technical knowledge, especially in mooring, unmooring, and navigation at sea. If the total absence of masts and rigging no longer requires the brave top-men of the classic sailing period, we must not forget that the modern ship has four or five times the displacement of the ancient one, and for this reason the enormous mass requires, from an exclusively sea-faring point of view, a great deal more care and attention than the smaller one, especially in heavy weather, both at sea and in harbour, whatever additional power may have been gained by steam capstans and other similar auxiliary machinery for working anchors, cables, &c. What would be said of a sailor who did not know how to take a turn with a rope's end thrown to him from a steamer coming alongside a wharf? And may we not fear, in addition, that such so-called sailors, instead of flying round in bad weather to secure the boats, anchors, or other movable objects, would throw themselves, one after the other, down into the nearest corner like a bale of cotton? What a case of desperation for the commander! And if, in war-time, with a little sea on, we add to these the torpedo men, electricians, and artificers, who, to the extent of 20 per cent., are simply "heaving their insides up," what becomes of the boasted offensive power of our ships? Nothing remains but for us to batten down hatches, close up batteries, and throw oil on the troubled waters. So Mr. Williams' book has a value for us, because we also have a reform to carry out, and a necessity to transform our seamen so that they may meet the requirements of the modern ship. And this transformation, or, rather, evolution, should begin on the old lines, bringing back the sailor to the old ship which can contend against the elements under sail, and which alone can make him a seaman. Independently of training ships and schools, our navy should possess a certain number of small ships, specially adapted to work under sail, and which would serve, so to speak, as permanent depositories for the lower or physical forces, and all men whose presence in the arsenals was not absolutely justified, should be sent to sea, in fair weather or foul, and kept there as long as food and water held out. These vessels might serve for small transport services from one port to another, but their main object should be to educate to the true "art of the sea," with its moral virtues and physical advantages, the youths who would be otherwise corrupted and enervated in our sea ports and cities, to their own irreparable injury and their country's delusion. Having found the sailors, it will be a simple matter to select from among them the stokers, the gunners, and also, if desired, the torpedoists.

"We do not hesitate for the rest to express our opinion that the proposals of Mr. Williams, although, perhaps, justified by his own special circumstances and the surroundings in which he lives and for which he thinks, are, for the most part, in opposition to the characteristic tendencies of this end of the century, which are all for the specialization of the various departments of work. For this reason, a reform essentially Italian must be in the direction of accentuating

this specialization, and we should aim more at having good artillerists, stokers, and seamen, than at forming jacks-of-all-trades, who, at the end of the reckoning, are perfect for none of these special services. They should all be put in such a position that they need not envy the pay and rations of the mercantile marine, and that, as they see old age approaching during their service of the State, they may be able always to say, 'I have a house of my own.'"

Most of the remaining part of the notice consists of extracts from Mr. Williams' book, and the reviewer says, in conclusion, that the author has brought so many questions to the front, and has exhibited them in such a convincing and practical form, that many will be led to reflect, and not the English only. The navy well merits the most loving care of the nation, and the saying of Sir J. E. Commerell, "England's best Foreign Minister is a strong navy," may well form the watchword of every maritime Power.

T. J. H.

NAVAL AND MILITARY NOTES.

NAVAL.

Home.—The terrible catastrophe in the Mediterranean, which has caused the death of one of our most distinguished Admirals, of nearly 400 other officers and men, and the loss of the "Victoria," a 1st class battle-ship, has called forth in a most marked degree the strongest expressions of sympathy from all parts of the world. In Sir G. Tryon the country has lost a gallant officer, a skilled seaman, a consummate tactician and strategist, and a man who had made himself most popular with all ranks of the Service who had come in contact with him. With regard to the gallant officers and men who shared his fate, they were the pick of the Service, and the country, while deeply mourning their loss, will recall with pride the magnificent discipline and the steadfast courage with which all alike met their fate. They died as nobly upholding the honour of their country's flag as if they had fallen, like so many brave men before them, face to face with the enemy.

The repairs to the "Howe" were completed and the ship floated out of dock on the 14th ultimo. On the 17th, escorted by the "Anson" and "Bellerophon," she left Ferrol under her own steam, and arrived safely at the Nore on the 22nd, the engines having worked satisfactorily the whole trip. She has since been placed in dock at Chatham, where it is expected her repairs will be completed in about three months.

The 1st class battle-ship "Hood" was commissioned on the 1st June, by Captain Jeffreys, for service in the Mediterranean; she will relieve the "Colossus," which ship returns to England, where she will probably take the place of the "Audacious" as 1st reserve ship, at Hull. The "Colossus," although relatively a new ship, and only commissioned for the first time in March, 1866, is yet, owing to her want of speed and insufficient armouring, out of place in a squadron such as the Mediterranean ought to be.

The "Vulcan" has been commissioned by Captain Durnford, and takes the place of the "Hecla" as torpedo-depôt and instruction ship.

The "Warspite," late flagship in the Pacific, has arrived at Devonport; after paying off, and the completion of some necessary repairs, she is to take the place of the "Triumph" as guard-ship at Queenstown.

The armoured cruiser "Undaunted" has returned from the Mediterranean and paid off, as also her sister ship the "Australia," to which, however, the officers and crew of the "Invincible," 1st reserve ship at Southampton, have been transferred, the "Invincible" being placed in the Fleet Reserve, at Portsmouth.

Two of the new 2nd class cruisers of the improved "Latona" type, the "Fox," at Portsmouth, and the "Charybdis," at Sheerness, were launched on the 15th ult.

Orders have been issued at Chatham for the commencement of the new battle-ship "Magnificent;" she is one of the two to be laid down this year under Lord Spencer's programme, and will have a length of 390 ft., with a beam of 75 ft., which will make her the largest battle-ship in the world. It is understood that

her armour is to be distributed in a somewhat novel fashion, but all details have been as yet kept a strict secret. This is as it should be. Her armament also will differ from the ships of the "Royal Sovereign" class, as instead of the 68-tons of the latter, the new ship will carry four 46-ton new pattern B.L. guns, 14 6-in. Q.F. guns, 28 other Q.F. guns, and seven torpedo-tubes. Her engines will be 13,000 H.P., intended to give a speed of 18 knots.

Orders have also been given at Chatham, Portsmouth, and Plymouth to commence the manufacture of the engines for the three new 2nd class cruisers, one of which is to be laid down at each of the above ports. These engines and boilers will be the largest yet constructed at the Government yards, as they are estimated to develop 9,600 I.H.P. The "Talbot," "Medusa," and "Minerva," as the three ships are to be called, will be 350 ft. long, 56 ft. beam, and have a displacement of 5,500 tons. They will carry five 6-in. B.L. guns, and six 4·7 Q.F. guns, besides smaller guns, and will almost rank with 1st class cruisers.

Brazil.—News was received in the middle of May of the total loss of the "Almirante Barroso," which went ashore on Ras-Garib, 125 miles to the south of Suez. She was a barque-rigged wooden corvette of the old style of some 2,000 tons displacement, and was *en route* to China and Japan on a special mission.

The new training cruiser, "Benjamin Constant," constructed at Les Chantiers de la Seyne, at Toulon, has lately completed her trials satisfactorily. She is a handsome, full-rigged, single-screw corvette of 2,800 tons displacement, 234 ft. long and with a beam of 45 ft. 6 in., is built of wood over an inner skin of steel, and has engines of 2,800 I.H.P. During an eight hours' run under natural draught she maintained a mean speed of 12·4 knots, and during a four hours' trial under forced draught the mean speed was 15·4 knots, which, considering her relatively speaking small engine power, was considered a great success for the builders of the ship, the speed contracted for being only 14 knots. She has a protective steel 2-in. deck, and carries for armament twelve 6-in. Q.F. guns, two 65-mm. Q.F. guns, eight machine guns and four torpedo-tubes, one bow, one stern, and one on each broadside. Her coal stowage is about 200 tons. The crew of the late "Almirante Barroso," who have been brought to Toulon, will, with their officers, be turned over to the "Benjamin Constant," and the ship is expected to leave almost immediately for Brazil. ("Le Yacht.")

France.—The active and reserve divisions of the Mediterranean Fleet have returned to Toulon, and are busy coaling and preparing for the summer manœuvres. The Channel Squadron have also returned to Brest for the same purpose. The French devote a great deal of time and trouble to torpedo-boat manœuvres. During the cruises of all three of their squadrons, every opportunity seems to be taken of exercising the torpilleurs of the "Défense Mobile" of the different ports, from Algiers and its harbours in the south to Dunkirk and Brest in the north, in attacking the cruising ships; while day after day the different flotillas put to sea and spend their time in making themselves thoroughly acquainted with every nook and shelter on the coast. Lately, when the Reserve Squadron was off the Algerian coast, the boats of the mobile defence of Algiers and Bona made a night attack; the squadron, which was proceeding with lights extinguished, was discovered by the torpedo craft to the north of Cape Bengout, some 30 miles from Algiers, and it is reported that the "Milan," which, at the time, was towing the "Aventurier," was struck. Other attacks were made off the Corsican coast and by the boats of the Défense Mobile of Brest on the northern squadron when at anchor in Douarnenez Bay, where it is reported two of the battle-ships would have been sunk.

The 1st class battery-cruiser "Tage," 7,345 tons, 12,410 I.H.P., and a speed of 19 knots, and the 3rd class barbette cruiser "Forbin," of 1,800 tons, 5,700 I.H.P., and a speed of 20 knots, having completed their repairs and received their new

armament of Q.F. guns, have been commissioned with a full complement for the summer cruising, and have been attached to the Reserve Squadron of the Mediterranean Fleet. The Active and Reserve Squadrons lately cruising in the Mediterranean number 14 battle-ships, 3 1st class, 2 2nd class, and 3 3rd class cruisers, 2 torpedo cruisers, 5 torpedo-avisos, and 10 torpilleurs-de-haute-mer. ("Le Petit Var.")

The new torpilleur-de-haute-mer "Lansquenet," which was launched at Nantes on the 18th May, has undergone her trials, and attained a speed of 26 knots; she is 138 tons displacement, 165 ft. 4 in. long, 15 ft. 8 in. beam, has a draught of 4 ft. 3 in., and her engines develop 2,800 I.H.P.; the "Grenadier," with a speed of 25 knots, has taken the place of the "Alarme," an older boat with only a speed of 20 knots, in the 2nd Division of the Channel Squadron.

The new torpedo-boat, No. 146, has also successfully completed her steam trials at Cherbourg, and attained a speed of 24·2 knots; she was built by Messrs. Normand.

Five torpedo-boats, Nos. 172 to 176, have been sent from Lorient to Toulon, to increase the strength of the Défense Mobile at the latter port.

Experiments with petroleum fuel are still being carried out at Cherbourg on board torpedo-boat No. 22. The probable incorrectness of the information with regard to the experiments with this fuel carried out at Toulon, and referred to in the Notes for March, has been confirmed. It transpired soon afterwards that 64 shells were fired from a 3-pr. Q.F. gun without the petroleum becoming ignited in any of the cases. ("Le Petit Var.")

Rear-Admiral Dupont, who only hoisted his flag in March last as commander of the 3rd Division of the active Mediterranean Fleet, has resigned his appointment, and has been succeeded by Rear-Admiral Gadand, who hoists his flag on board the "Dévastation" with Capitaine de Vaisseau Pissère as his chief of the staff. ("Le Petit Var.")

We mentioned last month the launch of the "Tréhouart," and we now give some details concerning her. The ship was originally laid down in September, 1889, as one of four coast-defence vessels of the "Jemmapes" type, an improvement on the "Furieux" class, the other two being the "Valmy" and "Bouvines." They are all much the same size, but considerable alterations have been made both in the "Bouvines" and "Tréhouart," so that they may now be classed as sea-going battle-ships. Among the alterations the most important are the raising of the free-board forward by 6½ ft., and to compensate for the extra weight thus introduced, the beam of the two ships has been increased by 3 ft., from 55 ft. 6 in. to 58 ft. 9 in., and 11·8-in. guns substituted for 13·4-in. as the main armament. The principal dimensions are—length 283 ft. 9 in., beam 58 ft. 9 in., extreme draught 24 ft. 4 in., with a displacement of 6,610 tons, I.H.P. of machinery 8,400, and an estimated speed under forced draught of 16 knots. Her armour consists of a complete all-round steel belt varying from 9·8 in. to 18 in., and a steel protective deck from 2·7 in. to 5 in. thick. The turrets are protected by 10-in. armour, with 14-in. revolving cupolas or turret covers. There are two 11·8-in. guns, mounted singly in the turret, one forward and one aft, eight 4-in. Q.F. guns with 3-in. steel shields, four 3-pr. Q.F., and ten 1-pr. Q.F. guns, and two torpedo-tubes. Her total cost will be 583,000*l.* ("Le Yacht.")

The theme for the Grand Manœuvres of the Mediterranean Fleet has been finally settled, and the object will be to study the necessary tactics and employment of cruisers in distant reconnaissances of fleets. Admiral Vignes' squadron will make its headquarters at Ajaccio, and thence will send out its cruisers to discover the in-

tentions of the enemy, represented by the Reserve Squadron under Admiral Boissondy, who will have for his base of operations the Hyères Islands, and who will either attack the coast of Algeria between Bougie and Cape Bon, or attempt to strike a blow at Corsica The manœuvres will be divided into three parts, beginning with tactical evolutions by the combined squadrons on the 1st July, and finally ending about the middle of August. As in previous years, a certain number of the Reservists will be called out, and the vessels of the Défense Mobile will patrol the coast.

Germany.—Vice-Admiral Schröder has hoisted his flag on board the "Baden" as Commander-in-Chief of the Manœuvre Fleet, with Captain Diederichsen as his Chief of the Staff. The following ships form the squadron.

1st Division :—
Battle-ships—"Baden," flagship.
" "Bayern."
" "Württemberg."
" "Sachsen."
Aviso—"Meteor."

2nd Division, under Rear-Admiral Karcher:
Battle-ships—"König-Wilhelm," flagship.
" "Deutschland."
Coast-defence battle-ships—"Beowulf."
" " "Frithjof."
Aviso battle-ship—"Jagd"

and the torpedo-aviso "Wacht," with 12 torpedo-boats; in addition to which the turret-ship "Friedrich der Grosse," 1st class cruiser "Kaiserin Augusta," 3rd class cruiser "See-Adler," armoured gunboat "Brummer," and the gunnery ships "Mars and "Carola." The operations will be under the direction of Admiral Baron von der Golz, head of the Admiralty, who will fly his flag on board the "Mars" or "Carola." H.R.H. Prince Henry of Prussia has been appointed to command the "Sachsen." ("Marine Rundschau.")

Italy.—Want of space has prevented our noticing sooner the trials of the new torpedo-cruiser "Aretusa," which took place in the early part of the year. This vessel is of the same class as the "Partenope," and is 227 ft. 6 in. long, 26 ft. 6 in. beam, has a displacement of 846·4 tons, with a mean draught of 10 ft. Her armament consists of five torpedo-tubes, four of which are traversing, while the fifth is fixed in the stem; one 4·7 Q.F., six 57-mm. Q.F., three 37-mm. Q.F., and three mitrailleuses. Her machinery is of the usual triple expansion type with four locomotive boilers to develop 4,000 I.H.P. under forced draught; the H.P. actually developed, however, was 4,422, and gave a mean speed during a three hours' run of 20·7 knots, although 21 knots was at one time actually reached; she has thus shown herself to be nearly a knot faster than the other vessels of her class previously completed, and a knot and a half faster than the contract speed stipulated for. Under natural draught a speed of 18 knots was averaged. She is protected by a 2-in. steel deck, and partially by her coal stowage. The ship and machinery were constructed by the firm of Orlando Bros., at Leghorn.

A vessel of a similar type, called the "Calatafimi," was launched in April from the Government dockyard at Castellamare, and torpedo-boat No. 144 from the Ansaldo yard at Sestri Ponente; the latter is 127 ft. 10 in. long, with a 16-ft. 6-in. beam, and a draught of 7 ft. Her speed is to be 22 knots, and she will, in addition to her torpedo-tubes, carry two 37-mm. (1·4-in.) Q.F. Hotchkiss guns. ("La Marine de France.")

The 2nd class cruiser "Marco Polo" is one of the ships to be pushed on to completion during the next 12 months. This ship was launched at Castellamare last

December, having been commenced on 7th January, 1890, and is a protected cruiser of superior power to the other 2nd class cruisers of the "Etna" and "Vesuvio" class. Her dimensions are as follows: Length, 325 ft.; beam, 45 ft. 6 in.; mean draught, 19 ft., with a displacement of 4,600 tons, and her two triple-expansion engines are to develop 10,000 I.H.P. under forced draught. At the moment of launching, the weight of the hull was about 2,100 tons; her machinery complete will weigh about 800 tons, which leaves about 1,600 tons for weight of armour, armament, stores, &c.; the coal supply will be about 600 tons. As protection, she has an armoured 4-in. steel belt amidships, 223 ft. long and 7 ft. 4 in. deep, of which 4 ft. 8 in. will be below the water-line; a central armoured redoubt of 4 in. steel between the protective and battery decks, and another 4-in. belt between the battery and upper deck 164 ft. 6 in. long and 7 ft. 3 in. deep; these outside belts are united at their extremities by 3-in. armoured bulkheads, which also enclose the redoubt. The protective deck is formed of two thicknesses of ½-in. steel plate, with a third plate of 1-in. steel on the slopes, and the whole of the space between the protective and battery decks is divided into numerous watertight compartments, to guard against any inrush of water caused by injury at the water-line. The upper deck between the armoured bulkheads is also formed of two thicknesses of ½-in. steel plates, and the whole of the steel employed in the construction of the ship is of Italian manufacture, the armour-plates coming from Terni. The armament will consist of six 6-in. and twelve 4·7 Q.F. guns, four torpedo-tubes above water on the battery deck at the extremities of the redoubt, and one submerged bow tube. All the guns will be in the redoubt, with the exception of two 4·7 Q.F., which will be mounted one forward and one aft protected by steel shields, besides which a number of small Q.F. guns will be disposed along the upper deck and in the two military tops. The ship is also provided with a powerful ram 8 ft. 6 in. below the water-line. Her complement will consist of 12 officers and 296 men of all ratings. ("Rivista Nautica.")

The "Esercito Romano" lately published a doleful account of the generally ineffective condition of the first fighting line of the Italian fleet from its Spezzia correspondent. A circumstantial report is given of the bad state in which the larger battle-ships were found to be on their return to Spezzia from Naples after the review before the German Emperor. The machinery of the "Affondatore" badly broke down, while the "Piemonte" had to be towed back, having in some way lost her rudder. The correspondent of the "Esercito," apparently a naval officer, managed to get on board one of the ships of the squadron, and he animadverts in strong terms upon the failure in the parade evolutions, and the running-fire practice displayed off Ischia before the Italian and German Sovereigns, on their visit to the squadron at sea, on board the "Lepanto." The "Re Umberto," firing at a target barely 600 yds. off, is said to have missed every time, and in some of the other ships it was found that the turrets could not be worked satisfactorily. During the steam manœuvres, a collision nearly occurred between the "Lepanto" and "Italia," and one or two collisions between other vessels are said to have actually taken place. The correspondent also sharply criticises the behaviour and appearance of the Italian seamen when on leave at Naples. Whether the reports are exaggerated or not remains to be proved, as the Ministry of Marine has ordered an inquiry.

The total charges included in the Italian Naval Estimates of 1892–94, upon which Captain Bettolo, a deputy, has presented an exhaustive report, amount to 99,738,270 lire, being a reduction of 2,495,052 lire upon the Estimates of last year. Since the year 1888–89, when the expenditure reached the maximum sum of 157,228,978 lire, *there has been a progressive reduction in the naval votes.* The chief diminution in the new Estimates is 2,000,000 lire in the chapter for new constructions; and though admitting this as financially necessary, the Report asks the Government to declare that such a reduction will not be repeated next year. The 25,000,000 lire devoted to building operations are to be devoted to the pushing forward of the 1st class ships "Sardegna" and "Sicilia," the 2nd class ships "Marco Polo" and "Elba," and the 3rd class cruiser "Calatafimi," as well as to

the constructive work of the battle-ships "Ammiraglio Saint Bon" and "Emanuel Filiberto," of five 2nd class ships, the "Calabria," "Vittor Pisani," "Carlo Alberto," "A" and "B," and of five 3rd class ships, the "Caprera," "Governolo," "L," "M," and "N," as well as of sea-going torpedo-boats and harbour ships. The Committee points out that there are in stock at the beginning of the financial year about 136,000,000 tons of coal, being 54,000,000 tons less than the supply to be normally maintained. ("Army and Navy Gazette.")

Russia.—The protected cruiser "Vitjaz" has been totally lost off Port Lazarev in the Gulf of Tartary. She was a sister ship to the "Rynda" and was of a type peculiar to the Russian navy, possessed of great sail power, being a heavily rigged barque; with a displacement of 3,200 tons and engines of 3,600 I.H.P. she could steam easily 15 knots; she had a 2-in. protective deck and an armament of 10 6-in. guns, 4 4-pr. Q.F., and 10 3-pr. Q.F. guns, with 4 torpedo-tubes. Being built of wood with an inner skin of steel and carrying as much as 700 tons of coal, the cruiser was a most useful vessel for foreign service, and her loss will be much felt.

"The Admiralty are proposing to create a great naval port in the Arctic Ocean. Although the proposal may seem strange on the face of it, yet it is only from a harbour there that the Russian navy will be free to act at all times of the year; as the Baltic is always closed by ice during the winter, and the Black Sea by international treaties.

"It appears that, from the mouth of the White Sea to the Varanger Fjord and North Cape, the coast of Russian Lapland or the peninsula of Kola (as it is often called) is always free from ice. Winter or summer it remains open to navigation. It is the only part of the sea-board of the immense Empire of the Czars which enjoys this advantage. Moreover, this coast, of which so little is known, presents other advantages no less valuable. Everywhere it is broken by deep bays, completely sheltered from storms and from surprise by an enemy, bays large enough for whole fleets to manœuvre in with ease. At the entrance of the Fjord of Kola is one of these fine bays; while, at some kilomètres from it, there is a second, no less well situated both from a military and naval point of view, and known as Port Vladimir. In 1885, the Grand Duke Vladimir, while travelling through Lapland, recognised the strategic value of this bay, and decided that it should be made a naval port. In fact, all along the coast of Russian Lapland, the Imperial navy has a large choice of harbours suitable for the establishment of a naval arsenal.

"The advantages of the creation of an arsenal here are obvious. Suppose a war broke out in the spring, the Russian Baltic ports would be still blocked by the ice; on the other hand, a fleet in the Arctic Ocean would be free in its movements, and in four days could appear in the North Sea and join hands with a French squadron; neither need it fear falling in with a hostile squadron, as it could come south, keeping in the neutral waters of the Norwegian Archipelago, and could issue from them at its pleasure.

"The creation of a Russian maritime arsenal on the shores of the Frozen Sea would mean the establishment of Russian supremacy over Northern Europe; and there are other advantages to be taken into account. The coast of Lapland is the seat of cod-fisheries, which until now have not attained the economic importance which they ought to have done. With encouragement this industry would rapidly develop largely. Every year in spring dense shoals of cod appear all along the coast, but for want of fishers up till now only a small quantity has been caught; in a few years the Imperial Government could easily create a fishing centre almost as important as that of Newfoundland. The fisheries would soon become an important source of revenue, while the fishermen would furnish splendid recruits for the fleet. In the interior stretch immense virgin forests of pine and fir, furnishing excellent wood and enormous supplies of tar, while there are large deposits of valuable minerals. It will be easy to connect the coast of the Frozen Sea with the centre of Russia, as a railway already runs from Uleaborg into Northern Finland, which can easily be pushed on to the coast, as there are no engineering difficulties, the

country being a vast plain, and would open up an immense tract of virgin territory. The railway completed and an arsenal established, Russia, quoting the words of Peter the Great when he founded St. Petersburg, would have a new and large window open from which to overlook Europe." ("Le Matin.")

It appears from the Naval Estimates that the Russian armaments are this year as follows: In the Baltic there have been fitted out altogether 114 vessels, including the Evolutionary Squadron (details of which were given in the April Notes), and the various ships and torpedo-boats for instructional purposes, gunnery and torpedo experiments, &c., and certain ships undergoing their machinery trials. The complements complete for these ships comprise 6 admirals, 126 officers of senior and 383 of junior rank, 44 officers of naval artillery, 120 navigating officers, 142 engineers, 51 doctors, 18 chaplains, 81 other officers, 394 marine guard, cadets, &c., and 12,477 seamen.

In the Black Sea, besides the usual manœuvres now being carried out by the Evolutionary Squadron (details of squadron given in the April Notes) there will be a programme of torpedo-exercise, finishing with discharges of live torpedoes against targets formed of old hulks. Altogether in the Black Sea 23 vessels have been fitted out, with complements consisting of 3 admirals, 36 senior and 171 junior officers, 21 officers of naval artillery, 58 navigating officers, 73 engineers, 28 doctors, 4 chaplains, 34 other officers, and 5,614 seamen.

In the Caspian there have been armed altogether seven ships with complements consisting of 7 senior and 15 junior officers, 10 navigators, 3 engineers, 8 doctors, and 413 seamen.

On the coast of Siberia is a flotilla of ten small vessels, with 9 senior and 26 junior officers, 14 navigating officers, 10 engineers, 4 doctors, 3 other officers, and 641 seamen; in commission abroad or on passage, there are six 1st class armoured and protected cruisers, three 2nd class cruisers, four gunboats, one special service ship, and two sea-going torpedo-boats. The total naval force of Russia in territorial waters for various purposes comprises 175 vessels, carrying 12 admirals, 215 senior and 748 junior officers, 86 officers of naval artillery, 235 navigating officers, 275 engineers, 114 doctors, 137 deck officers, 28 chaplains, 394 marine guards, cadets, &c., 81 civil employés, and 23,663 seamen and boys.

At present all the naval forces of Russia are comprised in three grand divisions, having two centres of administration in the Baltic and one in the Black Sea. The whole of the personnel necessary to complete these three divisions is divided into 25 crews numbered progressively 1 to 18 and 28 to 34, the first 18 belonging to the divisions attached to the Baltic, and the last seven to the Black Sea. In consequence of the extraordinary growth of the naval force, works on a large scale have been ordered at the Baltic and Black Sea ports; at Cronstadt, a dock 183 m. long by 27½ broad and 8·5 deep (594 ft. long, 87 ft. broad, and 28 ft. deep), and dredging operations for deepening the harbour; at Libau, since 1890, works to the extent of 50 million roubles expenditure have been undertaken, employing 6,000 men, which are to be completed in 1895; until now this magnificent port could only admit ships not drawing more than 17½ ft.; soon ships of any draught will be able to enter; at Odessa the works for the embarkation of petroleum and its transport to the various military centres continue, and finally it has been decided to undertake the completion of the ports of Sebastopol, Theodosia, and Nicholaeff. ("Riv. Marittima.")

United States.—We are able to give some further details of the armoured cruiser "New York," which ship has just concluded her final trials. The official trial took place at sea on May 22, over a 40-knot course, off the coast of Massachusetts, and the new cruiser more than fulfilled the expectation formed of her, as she showed an average speed of more than 21 knots per hour for four hours, although she had been designed to make only 20 knots. The revolutions of the engines averaged 135, boiler pressure 168 lbs., and the average speed for the four hours was given by Admiral Belknap, the head of the trial board, as 21·1 knots. This performance was especially satisfactory to the builders of the ship, the Messrs. Cramp, as they had

thereby earned a premium of 200,000 dollars, their contract with the Government having stipulated that they should receive 50,000 dollars for each ¼ knot of speed attained in excess of 20 knots per hour. The contract for the "New York" was signed August 28, 1890, her cost to be 2,985,000 dollars, and her keel was laid September following. She was described by Mr. Tracy, the Secretary for the Navy, as a splendid example of an all-round war-ship, having an unusual combination of great offensive and defensive powers, with extraordinary coal endurance and a high rate of speed. She is of 8,150 tons displacement, 380 ft. 6 in. long on the water-line, 64 ft. 10 in. beam, and her mean draught is 23 ft. 3 in.

The engines are twin-screw vertical triple-expansion, designed to indicate 15,000 maximum horse-power, but the report of the trial shows this was exceeded, as the I.H.P. was over 17,000. The ship has a coal capacity of 1,500 tons, with which she can steam 13,000 miles at a 10-knot speed without recoaling.

There is an all-round belt of 4-in. steel, extending 4 ft. above and 4 ft. below the water-line, and, in addition, a protective deck of steel 6 in. thick on the sloping sides, which extend 4¾ ft. below the water-line. Coal is also so stowed on the armour deck as to afford further protection. The main battery of the "New York" consists of six 8-in. and twelve 4-in. Q.F. guns; her secondary battery of eight 6-pr. Q.F. and four 1-pr. Q.F. guns, and four Gatlings. Vice-Admiral Sir J. Hopkins inspected the ship, and was particularly struck with the excellent protection given to the guns, which he admitted was far superior to that in his own flag-ship the "Blake." The two barbettes, in which four of the 8-in. guns are mounted, have a thickness of 10 in., and the conical revolving shields on the same guns are 7 in. thick. The sloping armour beneath the barbettes between the upper and the gun deck is 5 in. thick, as are also the ammunition tubes. The four broadside 8-in. guns have a protection of 8 in. The 4-in. guns are mounted in sponsons 4 in. thick, with protective shields covering the ports. Even the 6-pr. have 2-in. protection. Her freeboard to the upper deck is about 20 ft., and her 8-in. guns are 25 ft. above the water-line, so that they get an effective fire in all conditions of the sea. There are six above-water torpedo-tubes, one at the bow, one at the stern, and two on each broadside, and there are two military masts with double fighting tops and a look-out place for the commander, and an 8-in. steel-protected conning tower. ("Scientific American.")

In view of the adoption in England by the Admiralty of a new wire-wound 6-in. Q.F. gun for the navy, it is interesting to note that trials will soon be made at Sandy Hook of two wire-bound American guns. One is the Woodbridge 10-in. gun, built at the Water-town Arsenal under the supervision of the inventor, Dr. W. Woodbridge. The gun consists of a continuous steel tube overlaid throughout its rear half with a cylinder of closely-fitted steel staves, the whole wound with tinned steel wire, soldered or brazed in an oven. The whole length of the gun is divided into three sections by steel rings or bands, and forward of the staves the wire is wound directly upon the steel tube.

Another wire-wound gun, the Crozier 10-in., designed by a young officer of the Army Ordnance Department, whose name is given to the gun, is almost ready for trial. It was built at the Watervliet Factory, and consists of a steel tube overlaid from breech to muzzle with a practically continuous covering of steel wire, wound in layers, with a jacket cylinder enveloping the steel wire over the re-enforce, and a continuous layer of steel hoops covering the wire from the trunnion band forward to the muzzle. The coils of wire are electrically welded, end to end, so that the gun is wound with a continuous strand of wire. The breech mechanism is of the usual service type. The ordnance experts have taken every precaution in constructing these wire-wound guns to overcome the most obvious weak point of this type of gun, which lies in insufficient longitudinal strength. The friends of the wire-wound gun look upon it as a formidable rival of the so-called built-up gun. The wire-wound gun does not necessitate the handling and finishing of the great forgings required in the built-up constructions, and it is also claimed that it can be built both more quickly and more cheaply. ("Scientific American.")

MILITARY.

Austria-Hungary.—The "Mil. Wochenblatt," No. 54, gives an extract from a recent Report on the present state of the Austrian Red Cross Society. According to the Report, the Society has at its disposal 32 completely equipped transport columns for wounded, 2 transport columns of matériel, and a field hospital of 200 beds. The Society numbers 45,128 members. In case of war, it has at its disposal accommodation for 166 officers and 7,897 men in hospitals, and for 10 officers and 748 men in convalescent homes, and has arranged for 50 halting stations for sick, and for the care in private houses of 1,960 officers and 8,035 men. Further, it can count upon accommodation in religious hospitals for 5 officers and 1,567 men, and for 1,926 men in similar convalescent homes. The full Report will be found in "Das Rothe Kreuz," Nos. 3 and 4 of 1893.

Bolivia.—According to the Budget of 1893, the Bolivian army on the peace footing is composed of the following units:—

Guard of the President of the Republic: 3 officers and 19 men.
2 battalions of infantry, each of 29 officers and non-commissioned officers and 220 men.
2 squadrons of cavalry, each of 27 officers and non-commissioned officers, 140 men, and 200 horses.
1 squadron of mountain artillery, of 22 officers, &c., 140 men, and 108 mules.
1 train service of 2 officers, 10 men, and 60 mules.

The army comprises, moreover, a general staff, a corps of aides-de-camp, a court-martial, departmental staff, a corps of invalids, and a military college with 40 students. ("Revue Militaire de l'Étranger.")

Denmark.—The "Militaert-Tidsskrift" gives the following summary of the state of the new fortifications of Copenhagen at the end of 1892. The earthworks were finished on the west front and the Husum front. At Volden, the construction had been commenced of the casemated buildings which are intended to serve as powder magazines in peace-time and as shelters in war. The coast batteries of Avedöre and Hvidöre, on the left and right flanks of the land front, respectively, were armed. The forts of Garderhöj on the north front, Lyngby (near Gammel-mosegard) and Fortun are completed and armed. The first named was built and handed over in August last to the Minister of War by the Society for the Defence of the Country. The forts of Gladsaxe and Bagsvoerd, which are to secure the plateau of Gladsaxe against an attack from the west, will be finished this year. The sea fort of Middelgrund is approaching completion. The howitzer battery of Lynetten on the old sea front of Copenhagen was finished.

A combined portable axe and pick, the necessary complement of the Linneman shovel, and the invention of the Danish Captain Steenstruf, has been subjected to trials in several Continental armies, and has apparently given great satisfaction. It has been adopted in Denmark in the proportion of one to every six Linneman shovels. A full description of the tool is given in the May number of the "Memorial de Ingenieros del Ejército."

France.—A 7th division of cavalry will be created in the autumn, when the 31st Dragoons and 14th Hussars will be constituted.

The programme for the instructional journeys of officers detailed to attend the Superior War School this year is as follows. Both yearly classes will have an eight days' topographical expedition, after which the officers of the first year have a twenty days' journey in June, first visiting the works on the eastern frontier, Verdun and Pontarlier, and then carrying out geographical studies (mounted) in the neighbourhood of Verdun, Saint-Mihiel, Lunéville, Saint-Dié, Gérardmer, &c.

In July they will have mounted exercises connected with the tactics of the three arms. In August they will attend the firing exercises of a field artillery regiment, and during the great autumn manœuvres they will be attached to the higher staffs (down to brigades) to practise the duties of general staff officers, according to their respective ranks. The officers of the second year will execute a reconnaissance on the Alpine frontier, visit important battlefields, and take part in a fourteen days' general staff ride. In August they will attend the firing exercises of an artillery regiment, and in September will take part in the manœuvres as staff officers. ("La France Militaire.")

A new regulation has been issued (29th April) regarding the apparatus and service of optical telegraphy.

Experiments have recently been made, under the orders of General Morin, with the object of determining how far the ordinary agricultural plough can be utilized to assist in the rapid formation of shelter-trenches. The ploughs employed were arranged, in detachments of eight each, which followed each other in échelon at a few yards' distance, and so made eight furrows side by side. The loosened earth was easily dug out with a shovel, or even by hand, and formed into a breastwork. Thus, on the first journey of the detachment of eight ploughs, the soil is loosened for a depth of about 6¼ in. and along a track about 8 ft. wide, which represents the width of the trench. After removal of the soil the trench is deepened by a second journey, and so on, two ploughs being presently taken out of the trench and run along the front of the breastwork so as to loosen soil with which to increase the mass of the latter.

Germany.—The cavalry has recently received two new Regulations; an "Exerzir-Reglement" ("Cavalry Drill Book") and "Instructions for Field Engineering," &c. Hitherto there has been no special text-book for the guidance of the cavalry in the execution of the various pioneer duties required of it. The new drill book is issued as a "provisional" regulation. To enumerate all the points in which the present regulations differ from the 1886 drill book would require more space than is here available, but it may be said generally that the German Drill Regulations of 1893 differ much less from our own Cavalry Drill of 1891 than did the previous editions of those books, and most of the changes in the new German drill have reference to points in which corresponding changes were made in our own drill in 1891. Perhaps the most patent novelties are the increased importance apparently attached to the dismounted (fire) action of cavalry, the substitution of drill by fours for the time-honoured drill by threes (for which latter, by the way, so many of our officers were clamorous when our drill was revised in 1891), and the innovation of forming squadron to the front from column of troops on both flanks simultaneously, with the corresponding formation of column of troops from squadron in line by the directing troop (the *left* centre, of course, in Germany) advancing, while the rest follow in column.

The field artillery "Schiessvorschrift," of 29th May, 1890, is cancelled, and new regulations (which are issued as "provisional") came into force on the 22nd May last.

New patterns of field water-bottles and drinking-cups of aluminium have been approved.

There are to be siege manœuvres on a large scale at Thorn, during the latter half of September, in which troops of all arms will take part. At the same time manœuvres for the pontoniers will be carried out on the Rhine and Moder near Drusenheim. ("Armee Verordnungsblatt.")

The "Rev. du Cercle Mil.," quoting from the Berlin "Tägliche Rundschau," gives some details of the new armament for the Elbe forts. The fort on the island

of Neuwerk, at the mouth of the river, is to be armed (according to the paper quoted) with the largest guns yet turned out by Krupp, their calibre being 42 cm. (16·5 in.) and length 14 m. (78·7 ft.). With a maximum elevation of 10° 30′ their range will be 8,850 m. (9678·5 yds.). The other forts are to receive coast-guns of 24 cm. (9·4 in.), which with an angle of elevation of 44° will have a range of 20,000 m. (21,872 yds.).

In future a flag (yellow, with a black cross) is to be raised by all companies and batteries which are considered by the umpires at field manœuvres to be worsted in the fire-combat. The order for raising the flag is only to be given when the superiority of fire of the one party is so decided that the defeated troops cannot possibly advance for attack, and the continued attack of the other side would evidently succeed. The order for lowering the flag is to be given when a reinforcement, at least equal to the defeated party, is received by it, so that its former power of fire is restored, or the defeated troops retire on the support of a similarly strong body of fresh troops, or the retreating troops succeed in completely evading the fire-effect of the enemy for the time. In all cases, the order for raising or lowering this flag is to be given by an umpire. Some further details are given in the "Deutsche Heeres-Zeitung," No. 44.

Some details regarding the mode of preparation and remarkable properties of the new Silesian smokeless powder (Plastomenit), invented by Herr Güttler, are given in the May number of the "Neue Militärische Blätter." There appears to be little doubt that this is the most powerful and lasting explosive yet produced, and, according to the account given in the journal above quoted, the explosive action is more equable and regular than that of any known powder.

According to the "Feldbefestigungs-Vorschrift, 1893," which has been approved of officially for the instruction of the pioneers in Germany, the following thicknesses of the various materials are required as a protection from fire :—

From Rifle Fire.

Sand	29½ in.
Ordinary earth	39 „
Laid sods and turf, or peat soil	79 „
Rammed snow	5 ft. 7 in.
Corn-sheaves	16½ ft.
Fir	39 in.
Oak	24 „
Steel plate	about ⅛ in. (2 cm.)
Brickwork	19¼ in.
A double thickness of planks, filled in with 8 in. of finely broken stones.	

From Artillery Fire.

From shrapnel and fragments from	
Field artillery :	
Earth	from 16 to 39 in.
Wood as overhead cover	2 in.
Garrison and siege artillery :	
Earth	39 „
Wood as overhead cover	4 „
From individual shots striking fair :—	
Field artillery :	
Earth	from 39 to 79 in.
Brickwork	39 in.
Snow	about 27 ft.
Guns of garrison and siege artillery :—	
Earth	from 10 to 13 ft.

The new field gun, which will probably be issued in the autumn, is known as the field gun M/73–91, being a transformation of the existing model of 1873; the details of construction have not yet been officially published. As regards projectiles, unification has not yet been realized. The old common shell disappears, and there remain the explosive shell, case, and shrapnel; the latter taking the place of common shell as the principal and ordinary projectile. The combined time and percussion fuze is the only one to be used both with shrapnel and explosive shell. ("Revue du Cercle Mil.")

Italy.—Further regulations have been issued regarding the leave of officers. According to the latest order, the total yearly leave to be granted is not to exceed 120 days for general officers, 100 for staff (field) officers, 80 for captains, and 60 for subalterns; but in all cases the granting of leave is to be considered as a privilege, and not as a right, and is to be regulated according to the requirements of the service and of discipline.

On the 1st January, 1893, the average ages of officers of the Italian army were as follows:—Lieutenant-generals, 61 years; major-generals, 56 years; colonels of infantry, cavalry, artillery, and the general staff, 53, 51, 52¾, and 51½ years respectively; lieutenant-colonels of infantry, cavalry, artillery, and general staff, 53, 49¼, 50½, and 45½ years respectively; majors of infantry, cavalry, artillery, and general staff, 49¼, 45¾, 46, and 42 years respectively. In the first fifth of the captains the average age was $46\frac{2}{12}$, $43\frac{1}{12}$, $39\frac{10}{12}$, and $36\frac{10}{12}$ years, in the infantry, cavalry, artillery, and general staff, respectively. The 56 lieutenant-generals attained that rank at an average age of 54½ years, the youngest at 42, the oldest at 62; the 90 major-generals attained that rank at an average age of 53 years, the youngest at 46, the oldest at 62. The 333 colonels, including those of the general staff, attained that rank at an average age of 49¾ years, the youngest at 41¾, the oldest at 57¾.

In the May number of the "Neue Mil. Blätter" there is an extract from an important speech made by General Dal Verme, in the Italian Chamber of Deputies, regarding the bearing of the French fortification of Bizerta on the vital question of preponderance of power in the Mediterranean.

(The above extracts are taken from the "Neue Mil. Blätter.")

Roumania.—The cavalry has recently been reorganized. It will now consist of 8 regiments of 5 squadrons each (4 permanent and 1 non-permanent), and 8 regiments of 5 squadrons each (1 permanent and 4 non-permanent). In time of war all 5 squadrons of all regiments will be mobilized. ("Rev. Mil. de l'Étranger.")

The "Revue du Cercle Militaire," No. 26, gives details of the armament of the so-called retrenched camp of Focsani, the bridge-head of Namolosa, the retrenched camp of Galatz, and the batteries of the flank position of Obodesti. According to the journal quoted, the fortifications are being pushed on with great activity in the east, the only side from which the independence of Roumania can be menaced. These works, spoken of as the retrenched camp of Focsani, are really a defensive system of the first order, destined to defend the line of the Sereth and to close the Bulgarian *trouée, i.e.*, the 75 km. of plain between the left bank of the Danube at Galatz and the foot of the Carpathians at Focsani. This gateway of invasion, through which the Russians have several times passed in their enterprises against the Turks, is now closed, and may be considered absolutely barred, provided it be properly guarded.

Russia.—It is stated in the "Neue Mil. Blätter" for May, that the investigations of the Russian engineer Daniloff have proved beyond doubt the practicability of constructing a waterway, suitable for large ships, from the Black Sea to the Caspian. The scheme proposed by him includes the utilization of the Manytsch

river, the depth of which is to be increased by connecting it with neighbouring waters.

Details of the recent modifications in the organization of the reserve troops are given in the "Rev. Mil. de l'Étranger" for May.

Switzerland.—The strength of the army on 1st January, 1893, was as follows:—

Élite: General staff and railway detachment, 87; infantry, 95,321; cavalry, 3,105; artillery, 19,434; engineers, 7,355; sanitary troops, 4,601; administrative troops, 1,440; officers of the service of military justice, 81; total, 131,424.

Landwehr: General staff, 15; infantry, 59,408; cavalry, 2,979; artillery, 12,036; engineers, 3,601; administrative troops, 537; sanitary troops, 2,909; total, 81,485.

Landsturm: Officers, 2,812; non-commissioned officers, 7,020; men, 263,941; total, 273,773.

FOREIGN PERIODICALS.

MILITARY.

Militär-Wochenblatt.—No. 48. "1805 and 1870" (a comparison). "The Train Formations of the Russian Army." No. 50. "1805 and 1870" (*concluded*). "The French Offensive Spirit." "The Bursting of Rifle and Gun Barrels." No. 51. "Losses in Battle." "Analysis of the French 'Annuaire de l'Armée' for 1893." "The Bursting of Rifle and Gun Barrels" (*concluded*). No. 52. "The Regulations for Field Fortification." "Tactical Questions" (connected with the attack of infantry). No. 53. "Review of Book, 'Frontalschlacht und Flügelschlacht.'" "The present Organization, Strength, and Distribution of the French Cavalry." "The Economical, Political, and Strategical Importance of the Siberian Railway." No. 54. "The Siberian Railway" (*concluded*). "The Italian Naval Budget." "Guns with High Initial Velocities." No. 56. "A few Remarks regarding the Provisional Cavalry Drill." "The Naval Policy of the United States." "Swiss Provisional Regulations regarding Military Occupation, Duties in case of Civil Disorder, Insurrection, &c." No. 57. "The Loss of H.M.S. 'Victoria.'" "Strategical Railways of France."

Neue Militärische Blätter.—June. "Problems, Ancient and Modern, in Military and Ordinary Ballooning." "Modern Cruisers and their Employment in Naval Warfare on a Large Scale" (*continued*). "War, from the Naturalist's Point of View." "A Practice Ride of the Reconnoitrers of the 2nd Russian (Caucasus) Cossack Division." "The War of Blockade of the Future." "A Winter Hunt carried out by the 92nd Russian Infantry Regiment." "What is an Offensive Fleet?" (*continued.*)

Jahrbücher für die Deutsche Armee und Marine. June. "The Siege of Hildesheim during the Thirty Years' War, 1633—1634" (*concluded*). "The Loss of Cavalry Horses in the Campaign of 1806." "Custozza, an Example of the Action of Cavalry in the Fight." "The Service of Information and Security in the East and in the West" (a comparison of the Russian, German, and French Regulations for field duties). "What is the State of Chauvinism in Denmark?" "Der Volkskrieg an der Loire im Herbst 1870" (a criticism of F. Hönig's work). An article entitled "Umschau auf Militärtechnischem Gebiet" gives a good summary of the present state of the small-arm, gun, and armour questions in the principal foreign armies, including some details of the experiments with various forms of rifles conducted in the United States in 1890, with the object of selecting a magazine arm.

Organ der Mil.-Wiss. Vereine.—Heft 6. "Infantry Fire in Battle." "The Formation and Conduct of Artillery Masses in Battle."

Journal des Sciences Militaires.—June. "Strategy of Marches" (*continued*). "Objectives, Directions, and Fronts." "Mixed Military Bridges" (Bridges of wood and iron for crossing streams in mountainous countries and rapidly replacing the arches of destroyed bridges). "The Campaign of 1814" (*continued*). "The New Methods of Instruction." "The Education of the Soldier." "Defence of the Frontiers of France."

Revue Militaire de l'Étranger.—June. "The New German Cavalry Drill Regulations" (a good summary of the principal changes in the new drill). "The Railways of Turkey" (with map).

Spectateur Militaire.—1st June. "The Colonel of the First Grenadier of France." "Tactics of the Wars of the Middle Ages" (*continued*). 15th June. "Le Grand Carnot." "Les Cent-Suisses." "Tactics of the Wars of the Middle Ages" (*continued*). "The Question of the Right of Officers to retire from the Army."

Revue du Cercle Militaire.—No. 23. "The New German Cavalry Drill Regulations." "*En route* to Lake Tchad" (*continued*). "The Italian Army and the Review of Centocelle in 1888" (*continued*). No. 24. "The New German Cavalry Drill Regulations" (*continued*). "*En route* to Lake Tchad" (*continued*). "The Report of the Swiss Military Department for 1892." No. 25. "The Work of the Geographical Service in 1892." "The Italian Army and the Review of Centocelle in 1888" (*concluded*). "The New German Cavalry Drill Regulations" (*continued*). No. 26. "The New German Cavalry Drill Regulations" (*continued*).

Revue de Cavalerie.—June. "Cavalry on the Field of Battle" (*continued*). "The Supply of Men and the Remounts of the Cavalry of the Grand Army in 1806–7" (*continued*). "The Lieutenant Instructors at the Cavalry School at Saumur." "The Guard Cavalry Division at Solférino." "The Horse" (*continued*).

Revue Militaire Suisse.—June. "Extracts from the Annual Report of the Swiss Military Department for 1892." "Critical Observations on the Organization of the Swiss Infantry." "Message of the Federal Council to the Federal Assembly regarding the Armament, Equipment, and Instruction of the Landsturm."

NOTICES OF BOOKS.

Die Definizionen und Fundamentalsätze der Theorie des Gleichgewichtes schwimmender Körper: Eine kritische Besprechung der Stabilitätstheorie der Schiffe. By VICTOR LUTSCHAUNIG, Professor der Schiffbaukunde an der Schiffbausection der k. k. Akademie für Handel und Nautik in Triest. 1893.

This is a small treatise of about 70 pages, in which the author criticises the definitions and theories met with in works on the stability of ships and ship construction, generally accepted as authoritative, by such authors as Rankine, Reed, White, Guyon, Redtenbacher, Bouguer, and others. The term "metacentre," for example, appears to the author to be especially misleading as commonly applied, and the theories concerning it untenable, the word itself, whether it be considered of Greek or Roman origin, expressing similar contradictions, meta meaning "end," "goal,"

"beyond," "change," &c., and centre or centrum "the middle point," so that one might expect that a point so named would have very singular properties. Where the author's quarrel is not distinctly with terms and definitions his theories appear to be at least open to debate, but they are stated clearly and explained by figures, so that the work is well worth reading by those interested in the subject, which it may perhaps succeed in clearing of some of its present ambiguities. Here are some of the conclusions at which the author arrives: "The conception of a centre of gravity is not reconcilable with the conception of a fluid mass, because fluids have no centre of gravity. We cannot conceive, therefore, of the centre of gravity of the displaced fluid. In the case of a mass of fluid of a certain form and volume contained in an open vessel, we cannot say that the whole of the downward pressures diverge from the centre of gravity of the mass. The point designated as the centre of displacement in the stability theory of ships does not exist; the point so found is nothing but a geometrical ideal point by means of which the position of the point of application of the upward forces is obtained by calculation." The orthographical errors in the text are very numerous, especially in the quotations derived from foreign sources, and the book wants careful revision in this respect.

T. J. H.

Illustrated History of the Scottish Regiments. Book 2. *Second Dragoons (Royal Scots Greys).* By Lieutenant-Colonel PERCY GROVES. Illustrated by HARRY PAYNE. W. and A. K. Johnston, 1893. Price 3*s.*

The second number in this excellent series and a worthy successor of the history of the Black Watch which was noticed at length in the Journal for May.

Cavalry Literature; a Bibliographical Record of works on the History, Organization, Tactics, and Administration of Cavalry. By Major G. H. ELLIOT, 3rd Bengal Cavalry. Official. Issued by the Office of the Superintendent of Government Printing, India, 1893.

This is a most important work. It not only contains a very complete list of English and French books, ancient and modern, regarding the cavalry, but a brief notice of the contents is appended to the title of each work. Although there is no list of German books, all the known translations of cavalry literature into English and French are recorded. It is to be hoped that this invaluable work will be republished in England.

Section Columns from Parade to Battle. By Lieutenant-Colonel H. A. SAWYER, Commandant, 45th Rattray's Sikhs. Reprinted from the "Journal of the United Service Institution of India," No. 103.

The system of drill proposed in this pamphlet has been thoroughly tested in India, and found to work well. The principal points are as follows. First, the "General Battle Front," usually a thin bullet-ejecting line, one man deep, is divided into fractions 50 yds. in length. Each of these is worked by one company until the latter is expended, when its place is taken by another company, and so on. Each fraction of the general front, called a "Company Battle Front" is lined in succession as casualties occur by the sections of a company (originally placed at 100 to 150 yds. behind each other). In fact, the company battle front may be compared with the muzzle of a large machine-gun, its fire being fed by the men moving directly in rear of and following up the track of the thin battle front. Thus the company forms its own firing line, supports, and reinforcements, under its own leaders, and when effaced by casualties is replaced by another company. The second point has reference to the authoritative distinction between the various phases of the attack as hitherto recognised. The author discards the idea that an "attack" can commence at 3,000 yds., and considers that until within 800 yds. it cannot be possible to decide whether the troops are merely "engaging" or "attacking." It is further maintained that it results from the formation adopted that companies when extended do not pass beyond the General's control, for the company battle fronts, being organically connected with their Commanding officers in rear, can be withdrawn, advanced, or directed as required; and the author contends

that the system proposed admits of "battle manœuvring" such as can hardly be hoped for under the present regulations. There are many other points of detail and instruction in the pamphlet which will fully repay study.

List of Recent Foreign Books (Military).

De la Marche au Point de Vue Militaire. By Dr. Cortial. 1893. Paris: Lavauzelle. 1 fr. 25 c.

Les Armées de la Triple-Alliance: L'Armée Austro-Hongroise. By General Baron Kaulbars. Translated from the Russian by R. Candiani. 1893. Paris: Westhausser. 4 fr.

L'Armée de la Loire. By Grenest. 2nd (and last) Part. Paris: Grenier, 1893. 3 fr. 50 c.

La Chute de Khartoum. Par Borelli-Bey. Paris: May et Motteroz. 1893. 5 fr.

Von Löbell's Jahresberichte über die Veränderungen und Fortschritte im Militärwesen. 19th year, 1892. By Lieut.-General Th. v. Jarotsky. 1893. Berlin: Mittler. 10 mks.

Der Dienst des Generalstabes. By General Bronsart von Schellendorff. 3rd Edition, by Colonel Meckel. 1893. Berlin: Mittler. 8 mks. 50.

Die Gelände-Erkundung mit Rücksicht auf die Truppenführung (with instructions for sketches and reports). By Lieut.-Colonel Von Rüdgisch. 4th Edition. 1893. Leipzig: Lang. 4 mks.

Frontalschlacht und Flügelschlacht. Betrachtungen über die deutsche Gefechtsführung in den Schlachten bei Amiens und an der Hallue. By Lieut.-Colonel D. v. Malachowski. With two maps. 1893. Berlin: Eisenschmidt.

Der Felddienst in der russischen Armee. (1, A comparison of the Russian, German, and French regulations for field service; 2, The Jagdkommandos). By Freiherr von Tettau. 1893. Berlin: Liebel. 2 mks.

Die Vertheidigung von Metz im Jahre 1870, nebst einer Uebersicht der Operationen der französischen Rheinarmee. By A. Freiherr von Fircks. 2nd Edition, in three parts. 1st part, 1893. Leipzig: Lang. 2 mks. (The 2nd and 3rd parts will appear during the year.)

(Naval.)

Admiral Farragut. By Captain A. T. Mahan, U.S. Navy. 1893. London: Sampson Low, Marston, and Co. 6s.

NAMES OF MEMBERS who joined the Institution between the 1st April and the 30th June, 1893.

LIFE MEMBERS.

White, John B., Lieut. R.N.R.
Maclure, J. W., J.P. and D.L., Lancashire, M.P., Major late 40th Lan. V. Rif.
Cunningham, G. G., Major Derbys. Regt.
Blowers, C. E., Maj.-Gen. late Bom. S.C.
Glasgow, Earl of, G.C.M.G., Governor of New Zealand.
Biddlecombe, John, Mids. R.N.R.
Oliphant, L. J., Col. Gren. Gds.
Bythell, W. J., Capt. R.E.
England, E. L., Col. (h.p.) late Som. L.I.
Jeffreys, F. V., Capt. R.E.
Owen, C. H. W., Lieut. R.A.
Williams-Wynn, Sir H. L. Watkin, Bart., Lt.-Col., Montg. Yeo. Cav.
Ferguson, H. S., Commanding Nayar Brigade.
Ward, J., C.B., Col. 16th Middx. Vol. Rif.
Skinner, F. St. D., Capt. Rl. Suss. Regt.
Brown, F. T., Lieut. Duke of Edinburgh's Own Edin. Arty. (S. Div. R.A.).
Dickins, V. W. F., Lieut. 1st Middx. Vol. Rif.
Lucas, A. G., Lt.-Col. L. Suff. Hus. Yeo. Cav.
Faith, T., Lieut., 3rd Battn. Hamps. Regt.
Fergusson, W. H., Major Tay Vol. Div. R.E.
Mylne, W. C. R., Lt.-Gen. Ind. S.C.
Will, G., Lt.-Col., R.A.
Kelly, V. J., Lieut. Rl. Ir. Rif.
Harvey, H. C., Lieut. Rl. Ir. Rif.
Knox, A. W. F., Lieut. Rl. Ir. Rif.

ANNUAL SUBSCRIBERS.

Tuson, H. B., Maj.-Gen. R.M.A.
Newmarch, O. R., C.S.I., Maj.-Gen. Ind. S.C.
Stokes, F., Capt. 4th V.B. Hamps. Regt.
Tyrrel, J. F., Lieut. R.A.
Black, James, M.A., Rev., Chaplain R.N.
King, W. Tindal, late Lieut. Lon. Sco. Vol. Rif.
Wheatley, F. G., Capt. 1st V.B. Dorset Regt.
Fetherstonhaugh, T., Lieut. Scaf. Highrs.
Bulkeley, C. R., Col. 4th Battn. Oxf. L.I.
Brown, C. G., Lt.-Col. 4th Battn. Essex Regt.
Patrick, W., D.I.G. of Hospitals, R.N. (retd.).
Whittall, F. V., Capt. 1st Inf. Hyderabad Contingent.
Powell, A. L., Lieut. 19th Hus.
Goodridge, Walter S., Capt. R.N.
Stuart, J., Capt. Rl. Highrs.
Maconchy, E. W. S. K., D.S.O., Capt. Ind. S.C.
Welchman, E. W. St. G., Capt. 5th Inf. Hyderabad Contingent.
Hardy, T. H., Lieut. 5th Inf. Hyderabad Contingent.
Audain, G. M., Lieut. 5th Inf. Hyderabad Contingent.
Morris, D. O., Lieut. 5th Inf. Hyderabad Contingent.
Burton, R. W., Lieut. 5th Inf. Hyderabad Contingent.
Genth, L., Lieut. 4th Battn. S. Wales Bord.
Domvile, Compton E., Rear-Admiral.
Morgan, A. B., Col. late Norfolk Regt.
Hall, W., Lieut. 4th Battn. Arg. and Suthd. Highrs.
Griffith, Frank, Capt. 2nd Kent. Vol. Arty. (E. Div. R.A.).
Clarke, J. S., Lieut. 1st Battn. Rl. Lanc. Regt.
Rowe, H. J. A., Capt. Ind. S.C.
Prichard, C. S., Capt. Northn. Regt.
McNeile, J. M., Col. late R.E.
Armstrong, G. E., Lieut. late R.N.
Molyneux-Seel, E. H., Capt. King's Liverpool Regt.
Todd, C. C., Lieut. Rl. Dub. Fus.
Adams, A. N., Lt.-Col. King's Own Sco. Bord.
England, A. T., Lieut. Derbys. Regt.

Tanqueray, W. M., Capt. 1st Middx. Vol. Rif.
Marwood, H., Capt. N. Staff. Regt.
Barnett, W. A., Lieut. N. Staff. Regt.
Perkins, E. K., Lt.-Col. 2nd V.B. Hamps. Regt.
Weekley, G. M., Capt. 1st Middx. Vol. Rif.
Warne, H. M., Lieut. 12th Middx. Vol. Rif.
Wenden, J. G., Capt. 2nd V.B. Glouc. Regt.
Foote, Randolph F. O., Capt. R.N.
Gambier, James W., Capt. R.N.
Murphy, S. J. F. O'N., Lieut. Duke of Connaught's Own I. of W. Arty. (S. Div. R.A.).
Fletcher, B., Col. 1st Tower Ham. Vol. Rif.
Hawker, P. J. D., late Sub.-Lieut. R.N.
Dudgeon, F. A., Lieut. S. Lanc. Regt.
Fairholme, W. E., Capt. R.A.
Hancock, M., Col. 3rd Lon. Vol. Rif.
Gallwey, H. L., Capt. E. Lan. Regt.
Harrison, J. E. W., Lieut. 1st Middx. Vol. Rif.
Wild, H. C., Lieut. 1st Middx. Vol. Rif.
Hannay, O. C., Major Arg. and Suthd. Highrs.
Rooke, H. W., Lt.-Col. R.A.
Dowdall, W. M., Capt. Shanghai Vol. Engineers.
Doran, W. R. B., Capt. Rl. Irish Regt.
Long, W., Col. 4th Battn. Som. L.I.
Trollope, G. H., Lt.-Col. 13th Middx. Vol. Rif.
Inglis, H. A., Capt. R.A.
McCreery, N., Surg.-Major, A.M.S.
French, G. A., C.M.G., Col. R.A.
Hall, H. G. King, Lieut. R.N.
Mansford, H., Lieut. Med. Mil. Div. R.E.
Douglas-Willan, H. P., Lt.-Col. 1st (King's) Drag. Gds.
Benbow, J. E., Capt. 1st (King's) Drag. Gds.
Pennell, H. L., Capt. 1st (King's) Drag. Gds.
Bates, C. L., Capt. 1st (King's) Drag. Gds.
Levita, H. P., Capt. 1st (King's) Drag. Gds.
Fergusson, W. J. S., Capt. 1st (King's) Drag. Gds.
Briggs, C. J., Capt. 1st (King's) Drag. Gds.
Hulton, F. C. L., Lieut. 1st (King's) Drag. Gds.
Eastwood, H. de C., Lieut. 1st (King's) Drag. Gds.
Bell-Smyth, J. A., Lieut. 1st (King's) Drag. Gds.
Graham, F., Lieut. 1st (King's) Drag. Gds.
Berners, J. A., Lieut. 1st (King's) Drag. Gds.
Marter, W. M., Lieut. 1st (King's) Drag. Gds.
Williams, H. J., Lieut. 1st (King's) Drag. Gds.
Fernie, F. H., Lieut. 1st (King's) Drag. Gds.
Wildes, G. F. G., Lieut. 1st (King's) Drag. Gds.
Deacon, E., Lieut. 1st (King's) Drag. Gds.
Emley, A., Maj. Newcastle-on-Tyne Vols. R.E.
Howard, F., Lt.-Col. R.A.
Dawkins, A. F., Lieut. 1st Battn. Northd. Fus.
Ferguson, S. C., Lieut. 1st Battn. Northd. Fus.
Lambton, Hon. C., Capt. 1st Battn. Northd. Fus.
Moulton-Barrett, E. M., Lieut. 1st Battn. Northd. Fus.
Forster, J. E., Lt.-Col. late E. Kent Regt.
Lenox-Conyngham, J. S. M., Capt. Conn. Rang.
Coode, P., Lieut. W. Rid. Regt.
Tinker, E., Capt. R.A.
Paton, J. A., Lieut. Rl. Lanc. Regt.
Dodds, W. H., Capt. 1st Newcastle-on-Tyne Vols. R.E.
Loveless, W. K., Surg.-Capt. 1st V.B. Hants Regt.
Christie, E. J., Lieut. Rl. Ir. Rif.
Bradford, E. C., Lieut. Rl. Ir. Rif.
Williams, A. B., Major 7th Battn. The Rifle Brigade.
Wadge, Percy L., Lieut. R.N.R.